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LED LCD TV

SERVICE MANUAL

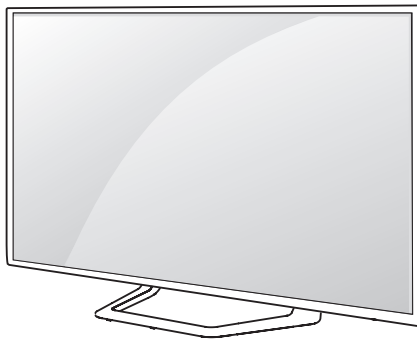
CHASSIS : LC22E

MODEL : 32LM6690

32LM6690-CC

CAUTION

BEFORE SERVICING THE CHASSIS,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.



P/NO : MFL67360905(1203-REV00)

Printed in China

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SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by \triangle in the Schematic Diagram and Exploded View.

It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.

Do not modify the original design without permission of manufacturer.

General Guidance

An **isolation Transformer should always be used** during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and its components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1 W), keep the resistor 10 mm away from PCB.

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

Leakage Current Cold Check(Antenna Cold Check)

With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.

If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1 M Ω and 5.2 M Ω .

When the exposed metal has no return path to the chassis the reading must be infinite.

An other abnormality exists that must be corrected before the receiver is returned to the customer.

Leakage Current Hot Check (See below Figure)

Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.

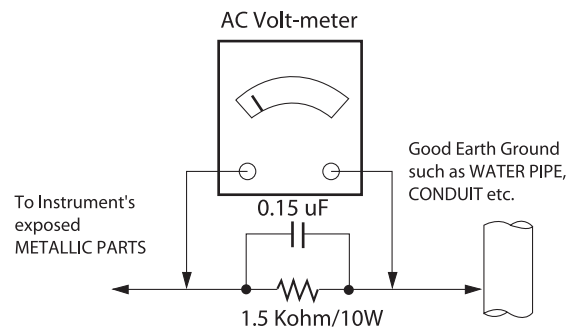
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 μ F capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.

Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which corresponds to 0.5 mA.

In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

Leakage Current Hot Check circuit



When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1 Ω

*Base on Adjustment standard

SERVICING PRECAUTIONS

CAUTION: Before servicing receivers covered by this service manual and its supplements and addenda, read and follow the **SAFETY PRECAUTIONS** on page 3 of this publication.
NOTE: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 3 of this publication, always follow the safety precautions. Remember: Safety First.

General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;
 - a. Removing or reinstalling any component, circuit board module or any other receiver assembly.
 - b. Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
 - c. Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.**CAUTION:** A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.
2. Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc) equipped with a suitable high voltage probe. Do not test high voltage by "drawing an arc".
3. Do not spray chemicals on or near this receiver or any of its assemblies.
4. Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator; 10 % (by volume) Acetone and 90 % (by volume) isopropyl alcohol (90 % - 99 % strength)
CAUTION: This is a flammable mixture.
Unless specified otherwise in this service manual, lubrication of contacts is not required.
5. Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
6. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
7. Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead.
Always remove the test receiver ground lead last.
8. Use with this receiver only the test fixtures specified in this service manual.
CAUTION: Do not connect the test fixture ground strap to any heat sink in this receiver.

Electrostatically Sensitive (ES) Devices

Some semiconductor (solid-state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the unit under test.

2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static type solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

General Soldering Guidelines

1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range of 500 °F to 600 °F.
2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a mall wire-bristle (0.5 inch, or 1.25 cm) brush with a metal handle. Do not use freon-propelled spray-on cleaners.
5. Use the following unsoldering technique
 - a. Allow the soldering iron tip to reach normal temperature. (500 °F to 600 °F)
 - b. Heat the component lead until the solder melts.
 - c. Quickly draw the melted solder with an anti-static, suction-type solder removal device or with solder braid.
CAUTION: Work quickly to avoid overheating the circuit board printed foil.
6. Use the following soldering technique.
 - a. Allow the soldering iron tip to reach a normal temperature (500 °F to 600 °F)
 - b. First, hold the soldering iron tip and solder the strand against the component lead until the solder melts.
 - c. Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.
CAUTION: Work quickly to avoid overheating the circuit board printed foil.
 - d. Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.

IC Remove/Replacement

Some chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

Removal

1. Desolder and straighten each IC lead in one operation by gently prying up on the lead with the soldering iron tip as the solder melts.
2. Draw away the melted solder with an anti-static suction-type solder removal device (or with solder braid) before removing the IC.

Replacement

1. Carefully insert the replacement IC in the circuit board.
2. Carefully bend each IC lead against the circuit foil pad and solder it.
3. Clean the soldered areas with a small wire-bristle brush. (It is not necessary to reapply acrylic coating to the areas).

"Small-Signal" Discrete Transistor

Removal/Replacement

1. Remove the defective transistor by clipping its leads as close as possible to the component body.
2. Bend into a "U" shape the end of each of three leads remaining on the circuit board.
3. Bend into a "U" shape the replacement transistor leads.
4. Connect the replacement transistor leads to the corresponding leads extending from the circuit board and crimp the "U" with long nose pliers to insure metal to metal contact then solder each connection.

Power Output, Transistor Device

Removal/Replacement

1. Heat and remove all solder from around the transistor leads.
2. Remove the heat sink mounting screw (if so equipped).
3. Carefully remove the transistor from the heat sink of the circuit board.
4. Insert new transistor in the circuit board.
5. Solder each transistor lead, and clip off excess lead.
6. Replace heat sink.

Diode Removal/Replacement

1. Remove defective diode by clipping its leads as close as possible to diode body.
2. Bend the two remaining leads perpendicular y to the circuit board.
3. Observing diode polarity, wrap each lead of the new diode around the corresponding lead on the circuit board.
4. Securely crimp each connection and solder it.
5. Inspect (on the circuit board copper side) the solder joints of the two "original" leads. If they are not shiny, reheat them and if necessary, apply additional solder.

Fuse and Conventional Resistor

Removal/Replacement

1. Clip each fuse or resistor lead at top of the circuit board hollow stake.
2. Securely crimp the leads of replacement component around notch at stake top.

3. Solder the connections.

CAUTION: Maintain original spacing between the replaced component and adjacent components and the circuit board to prevent excessive component temperatures.

Circuit Board Foil Repair

Excessive heat applied to the copper foil of any printed circuit board will weaken the adhesive that bonds the foil to the circuit board causing the foil to separate from or "lift-off" the board. The following guidelines and procedures should be followed whenever this condition is encountered.

At IC Connections

To repair a defective copper pattern at IC connections use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections).

1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary).
2. Carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.
3. Bend a small "U" in one end of a small gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the out-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area and clip off any excess jumper wire.

At Other Connections

Use the following technique to repair the defective copper pattern at connections other than IC Pins. This technique involves the installation of a jumper wire on the component side of the circuit board.

1. Remove the defective copper pattern with a sharp knife. Remove at least 1/4 inch of copper, to ensure that a hazardous condition will not exist if the jumper wire opens.
2. Trace along the copper pattern from both sides of the pattern break and locate the nearest component that is directly connected to the affected copper pattern.
3. Connect insulated 20-gauge jumper wire from the lead of the nearest component on one side of the pattern break to the lead of the nearest component on the other side.

Carefully crimp and solder the connections.

CAUTION: Be sure the insulated jumper wire is dressed so the it does not touch components or sharp edges.

SPECIFICATION

NOTE : Specifications and others are subject to change without notice for improvement.

1. Application range

This specification is applied to the LCD TV used LC22E chassis.

2. Requirement for Test

Each part is tested as below without special appointment.

- 1) Temperature: 25 °C ± 5 °C(77 °F ± 9 °F), CST: 40 °C ± 5 °C
- 2) Relative Humidity: 65 % ± 10 %
- 3) Power Voltage
 - : Standard input voltage (AC 100-240 V~, 50/60 Hz)
 - * Standard Voltage of each products is marked by models.
- 4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.
- 5) The receiver must be operated for about 20 minutes prior to the adjustment.

3. Test method

- 1) Performance: LGE TV test method followed
- 2) Demanded other specification
 - Safety : CE, IEC specification
 - EMC : CE, IEC
 - Wireless : Wireless HD Specification (Option)

4. Model General Specification

No.	Item	Specification	Remarks
1.	Market	CHINA , HONG KONG (PAL/DVB Market)	
2.	Broadcasting system	1) PAL/SECAM-B/G/D/K 2) PAL-I/II 3) NTSC-M 4) DVB-T	
3.	Receiving system	Analog : Upper Heterodyne Digital : COFDM(DVB-T)	► DTMB (Carrier , Code Rate , Constellation , Frame Header , Interleaving)*. China - MODE1 : 3780 , 0.4 , 16QAM , PN945 , 720 , 9.626Mbps - MODE2 : 1 , 0.8 , 4QAM , PN595 , 720 , 10.396Mbps - MODE3 : 3780 , 0.6 , 16QAM , PN945 , 720 , 14.438Mbps - MODE4 : 1 , 0.8 , 16QAM , PN595 , 720 , 20.791Mbps - MODE5 : 3780 , 0.8 , 16QAM , PN420 , 720 , 21.658Mbps - MODE6 : 3780 , 0.6 , 64QAM , PN420 , 720 , 24.365Mbps - MODE7 : 1 , 0.8 , 32QAM , PN595 , 720 , 25.989Mbps *. HONG KONG - MODE : 3780 , 0.4/0.6 , 4/16/64QAM , PN945 , 720 QPSK : 1/2, 2/3, 3/4, 5/6, 7/8 16-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 64-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 ► DVB-C - Symbolrate : 4.0Msymbols/s to 7.2Msymbols/s - Modulation : 16QAM, 64-QAM, 128-QAM and 256-QAM
4.	Video Input RCA(1EA)		AV gender jack 1EA
5.	Component Input	Y/Cb/Cr, Y/Pb/Pr	
6.	RGB Input	RGB-PC	Analog(D-SUB 15PIN)
7.	HDMI Input	HDMI1-DTV/DVI,HDMI2-DTV/DVI HDMI3-DTV/DVI,HDMI4-DTV/DVI	PC(HDMI version 1.3) Support HDCP
8.	Audio Input	RGB/DVI Audio AV Component	L/R Input
9.	SPDIF out	SPDIF out	
10	USB Input	FEMF, DivX HD, For SVC (download)	JPEG, MP3, DivX HD
11	Lan Jack		

5. Component Video Input (Y, C_B/P_B, C_R/P_R)

No.	Resolution	H-freq(kHz)	V-freq(Hz)	Proposed
1	720×480	15.73	60.00	SDTV, DVD 480i
2	720×480	15.63	59.94	SDTV, DVD 480i
3	720×480	31.47	59.94	480p
4	720×480	31.50	60.00	480p
5	720×576	15.625	50.00	SDTV, DVD 625 Line
6	720×576	31.25	50.00	HDTV 576p
7	1280×720	45.00	50.00	HDTV 720p
8	1280×720	44.96	59.94	HDTV 720p
9	1280×720	45.00	60.00	HDTV 720p
10	1920×1080	31.25	50.00	HDTV 1080i
11	1920×1080	33.75	60.00	HDTV 1080i
12	1920×1080	33.72	59.94	HDTV 1080i
13	1920×1080	56.250	50	HDTV 1080p
14	1920×1080	67.5	60	HDTV 1080p

6. RGB input (PC)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Proposed	Remark
1	720*400	31.468	70.08	VESA(VGA)	For only DOS mode
2	640*480	31.469	59.94	VESA(SVGA)	Input 848*480 60Hz, 852*480 60Hz ->640*480 60Hz Display
3	800*600	37.879	60.31	VESA(XGA)	
4	1024*768	48.363	60.00	VESA	
5	1360*768	47.72	59.8	VESA(WXGA)	
6	1920*1080	66.587	59.93	WUXGA(CEA 861D)	FHD only

7. HDMI Input

7.1. DTV mode

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Proposed	Proposed
1.	720*480	31.469 / 31.5	59.94 / 60	27.00/27.03	SDTV 480P
2.	720*576	31.25	50	54	SDTV 576P
3.	1280*720	37.500	50	74.25	HDTV 720P
4.	1280*720	44.96 / 45	59.94 / 60	74.17/74.25	HDTV 720P
5.	1920*1080	33.72 / 33.75	59.94 / 60	74.17/74.25	HDTV 1080I
6.	1920*1080	28.125	50.00	74.25	HDTV 1080I
7.	1920*1080	26.97 / 27	23.97 / 24	74.17/74.25	HDTV 1080P
8.	1920*1080	33.716/ 33.75	29.976/30.00	74.25	HDTV 1080P
9.	1920*1080	56.250	50	148.5	HDTV 1080P
10.	1920*1080	67.43 / 67.5	59.94 / 60	148.35/148.50	HDTV 1080P

7.2. PC mode

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Proposed	Remark
1	720 x 400	31.468	70.08		HDCP
2	640 x 480	31.469	59.94	VESA	HDCP
3	800 x 600	37.879	60.31	VESA	HDCP
4	1024 x 768	48.363	60.00	VESA(XGA)	HDCP
5	1360 x 768	47.712	59.8	WXGA	HDCP
6	1280 x 1024	63.595	60.0	SXGA	HDCP / FHD model
7	1920 x 1080	67.5	60.0	WUXGA	HDCP / FHD model

ADJUSTMENT INSTRUCTION

1. Application Range

This specification sheet is applied to all of the LED LCD TV with LC22E chassis.

2. Designation

- (1) Because this is not a hot chassis, it is not necessary to use an isolation transformer. However, the use of isolation transformer will help protect test instrument.
- (2) Adjustment must be done in the correct order.
- (3) The adjustment must be performed in the circumstance of $25 \pm 5^{\circ}\text{C}$ of temperature and $65 \pm 10\%$ of relative humidity if there is no specific designation.
- (4) The input voltage of the receiver must keep 100~240V, 50/60Hz.
- (5) The receiver must be operated for about 5 minutes prior to the adjustment when module is in the circumstance of over 15.

In case of keeping module is in the circumstance of 0°C , it should be placed in the circumstance of above 15°C for 2 hours

In case of keeping module is in the circumstance of below -20°C , it should be placed in the circumstance of above 15°C for 3 hours.

Caution) When still image is displayed for a period of 20 minutes or longer (especially where W/B scale is strong. Digital pattern 13ch and/or Cross hatch pattern 09ch), there can some afterimage in the black level area.

3. Adjustment items

3.1 Main PCB check process

- MAC Address Download
- Wide-Vine Key Download
- Adjust 1920*1080 Comp1
- Adjust 1920*1080 RGB
- EDID/DDC download

Above adjustment items can be also performed in Final Assembly if needed. Both Board-level and Final assembly adjustment items can be check using In-Start Menu.

1.ADJUST CHECK.

3.2. Final assembly adjustment

- White Balance adjustment
- RS-232C functionality check
- PING Test
- Factory Option setting per destination
- Ship-out mode setting (In-Stop)

3.3. Etc

- Ship-out mode
- Service Option Default
- USB Download(S/W Update, Option, Service only)
- ISP Download(Option)

4.Automatic Adjustment

- Enter Service Mode by pushing "ADJ" key,
- Enter ADC mode by pushing "►" key at "8. ADC Calibration"
- There are 2 ways for ADC Calibration. (OTP, External)

*. OTP mode

: Automatic ADC Calibration. (Internal ADC Calibration) On the manufacture line, OTP is used for ADC Calibration automatically.

*. External mode

: Manual ADC Calibration. When OTP mode is failed, ADC calibration should be "OK" by using External mode.

4.1. Final assembly adjustment

1. Change the ADC type "OTP" by using "►"key.
2. Enter "Start" key.
3. Check the sign "OK" below ADC type.

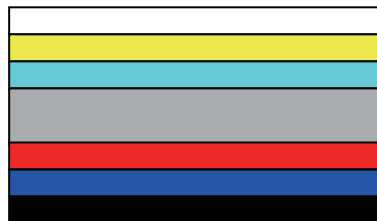
4.1.2 External ADC Adjustment

Overview

ADC adjustment is needed to find the optimum black level and gain in Analog-to-Digital device and to compensate RGB deviation.

Equipment & Condition

- 1) USB to RS-232C Jig
- 2) MSPG-925 Series Pattern Generator(MSPG-925FA, pattern -65)
 - Resolution: 1080P Comp1
 - 1920*1080P RGB
 - Pattern : Horizontal 100% Color Bar Pattern
 - Pattern level : 0.7 ± 0.1 Vp-p
 - Image



Adjustment method

- Using USB, adjust items listed in 3.1 in the other shown in "4.1.3.3"

Adj. protocol

Protocol	Command	Set ACK
Enter adj. mode	aa 00 00	a 00 OK00x
Source change	xb 00 04 xb 00 06	b 00 OK04x (Adjust 480i, 1080p Comp1) b 00 OK06x (Adjust 1920*1080 RGB)
Begin adj.	ad 00 10	
Return adj. result		OKx (Case of Success) NGx (Case of Fail)
Read adj. data	(main) ad 00 20 (sub) ad 00 21	(main) 000000000000000000000000000000007c:007b006dx (Sub) 000000070000000000000000000000007c:00830077x
Confirm adj	ad 00 99	NG 03 00x (Fail) NG 03 01x (Fail) NG 03 02x (Fail) OK 03 03x (Success)
End adj.	aa 00 90	a 00 OK90x

Ref.) ADC Adj. RS232C Protocol_Ver1.0

Adj. order

- ```

•aa 00 00 [Enter ADC adj. mode]
•xb 00 04 [Change input source to Component1(480i&1080p)]
•ad 00 10 [Adjust 480i&1080p Comp1]
•xb 00 06 [Change input source to RGB(1024*768)]
•ad 00 10 [Adjust 1920*1080 RGB]
•aa 00 90 End adj.

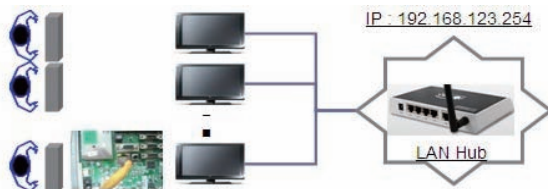
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Ref) ADC adj. RS232C Protocol\_Ver1.0

## 4.2 LAN Inspection

#### 4.2.1 Equipment & Condition

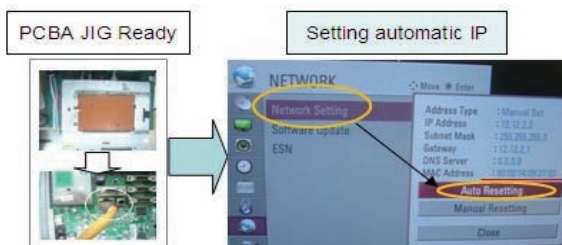
- Each other connection to LAN Port of IP Hub and Jig.



#### 4.2.2 LAN inspection solution

### LAN Port connection with PCB

- Network setting at MENU Mode of TV
  - setting automatic IP
  - Setting state confirmation
- If automatic setting is finished, you confirm IP and MAC Address.



### 4.2.3 WIDEVINE Key Inspection

- . WIDEVINE Key Inspection  
- Confirm Key input Data at the “IN START” MENU Mode



### 4.3 LAN PORT INSPECTION(PING TEST)

Connect: SET-> LAN Port == PC-> LAN Port

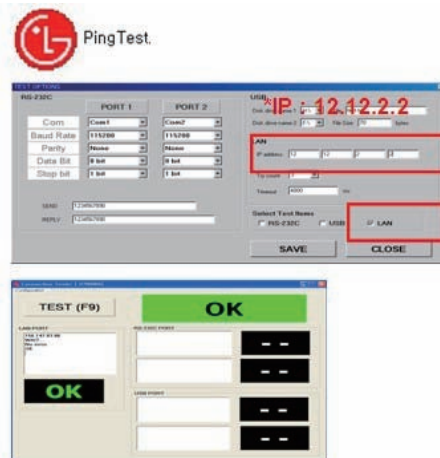


#### 4.4.1. Equipment setting

- 1) Play the LAN Port Test PROGRAM.
  - 2) Input IP set up for an inspection to Test Program.
- \*IP Number : 12.12.2.2

#### 4.4.2. LAN PORT inspection (PING TEST)

- 1) Play the LAN Port Test Program.
- 2) connect each other LAN Port Jack.
- 3) Play Test (F9) button and confirm OK Message.
- 4) remove LAN CABLE



## 4.3 Model name & Serial number Download

### 4.3.1 Model name & Serial number D/L

- Press "Power on" key of service remotecon.(Baud rate : 115200 bps)
- Connect RS-232C Signal to USB Cable to USB.
- Write Serial number by use USB port.
- Must check the serial number at Instart menu.

### 4.3.2 Method & notice

- A. Serial number D/L is using of scan equipment.
- B. Setting of scan equipment operated by Manufacturing Technology Group.
- C. Serial number D/L must be conformed when it is produced in production line, because serial number D/L is mandatory by D-book 4.0.
- \* Manual Download (Model Name and Serial Number)  
If the TV set is downloaded By OTA or Service man, Sometimes model name or serial number is initialized.( Not always)  
There is impossible to download by bar code scan, so It need Manual download.
- a. Press the 'instart' key of ADJ remote controller.
- b. Go to the menu '5.Model Number D/L' like below photo.
- c. Input the Factory model name(ex 47LM6200-CC) or Serial number like photo.



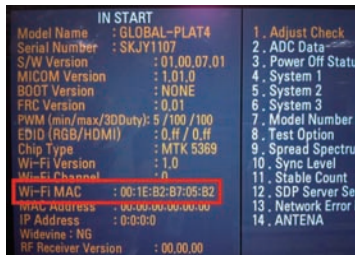
- d. Check the model name Instart menu -->Factory name displayed (ex 47LM62000-CA)
- e. Check the Diagnostics (DTV country only) --> Buyer model displayed (ex 47LM6200-CC)

## 4.4 WIFI MAC ADDRESS CHECK

- a. Using RS232 Command

|              | Command                      | Set ACK             |
|--------------|------------------------------|---------------------|
| Transmission | [A][I][I][Set ID][I][20][Cr] | [O][K][x] or [N][G] |

- b. check the menu on in-start



## 5. Manual Adjustment

### 5.1. ADC adjustment is not needed because of OTP(Auto ADC adjustment)

### 5.2. EDID (The Extended Display Identification Data) / DDC (Display Data Channel) download

#### 5.2.1 Overview

It is a VESA regulation. A PC or a MNT will display an optimal resolution through information sharing without any necessity of user input. It is a realization of "Plug and Play".

#### 5.2.2 Equipment

- Since embedded EDID data is used, EDID download JIG, HDMI cable and D-sub cable are not need.
- Adjust remotecon

#### 5.2.3 Download method

- 1) Press Adj. key on the Adj. R/C, then select "12.EDID D/L".  
By pressing Enter key, enter EDID D/L menu.
- 2) Select [Start] button by pressing Enter key, HDMI1 / HDMI2 / HDMI3 / HDMI4 / RGB are Writing and display OK or NG.

| For Analog EDID | For HDMI EDID                 |  |
|-----------------|-------------------------------|--|
| D-sub to D-sub  | DVI-D to HDMI or HDMI to HDMI |  |
|                 |                               |  |

## RGB\_EDID DATA

|      | 0x00 | 0x01 | 0x02 | 0x03 | 0x04 | 0x05 | 0x06 | 0x07 | 0x08 | 0x09 | 0x0A | 0x0B | 0x0C | 0x0D | 0x0E | 0x0F |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0x00 | 00   | FF   | FF   | FF   | FF   | FF   | FF   | 00   | 1E   | 6D   | a    |      |      | b    |      |      |
| 0x01 | c    | 01   | 03   | 68   | A0   | 5A   | 78   | 0A   | EE   | 91   | A3   | 54   | 4C   | 99   | 26   |      |
| 0x02 | 0F   | 50   | 54   | A1   | 08   | 00   | 31   | 40   | 45   | 40   | 61   | 40   | 71   | 40   | 81   | 80   |
| 0x03 | 01   | 01   | 01   | 01   | 01   | 01   | 02   | 3A   | 80   | 18   | 71   | 38   | 2D   | 40   | 58   | 2C   |
| 0x04 | 45   | 00   | A0   | 5A   | 00   | 00   | 00   | 1E   | 66   | 21   | 50   | B0   | 51   | 00   | 1B   | 30   |
| 0x05 | 40   | 70   | 36   | 00   | A0   | 5A   | 00   | 00   | 00   | 1E   | 00   | 00   | 00   | FD   | 00   | 3A   |
| 0x06 | 3E   | 1E   | 53   | 10   | 00   | 0A   | 20   | 20   | 20   | 20   | 20   |      |      | d    |      |      |
| 0x07 |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 00   | e3   |

## 5.2.4 EDID DATA

### \*Reference

- HDMI1 ~ HDMI4 / RGB
- In the data of EDID, bellows may be different by S/W or Input mode.

### \*Product ID

| HEX  | EDID Table | DDC Function |
|------|------------|--------------|
| 0001 | 0100       | Analog       |
| 0001 | 0100       | Digital      |

\* Serial No: Controlled on production line.

\*Month, Year: Controlled on production line: ex)

Monthly : '01' -> '01'

### 3D FHD RGB EDID data

|      | 0x00 | 0x01 | 0x02 | 0x03 | 0x04 | 0x05 | 0x06 | 0x07 | 0x08 | 0x09 | 0x0A | 0x0B | 0x0C | 0x0D | 0x0E | 0x0F |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0x00 | 00   | FF   | FF   | FF   | FF   | FF   | FF   | 00   | 1E   | 6D   | a    |      |      | b    |      |      |
| 0x01 | c    | 01   | 03   | 80   | A0   | 5A   | 78   | 0A   | EE   | 91   | A3   | 54   | 4C   | 99   | 26   |      |
| 0x02 | 0F   | 50   | 54   | A1   | 08   | 00   | 31   | 40   | 45   | 40   | 61   | 40   | 71   | 40   | 81   | 80   |
| 0x03 | 01   | 01   | 01   | 01   | 01   | 01   | 02   | 3A   | 80   | 18   | 71   | 38   | 2D   | 40   | 58   | 2C   |
| 0x04 | 45   | 00   | A0   | 5A   | 00   | 00   | 00   | 1E   | 66   | 21   | 50   | B0   | 51   | 00   | 1B   | 30   |
| 0x05 | 40   | 70   | 36   | 00   | A0   | 5A   | 00   | 00   | 00   | 1E   | 00   | 00   | 00   | FD   | 00   | 3A   |
| 0x06 | 3E   | 1E   | 53   | 10   | 00   | 0A   | 20   | 20   | 20   | 20   | 20   |      |      | d    |      |      |
| 0x07 |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 01   | e1   |
| 0x08 | 02   | 03   | 37   | F1   | 4E   | 10   | 9F   | 04   | 13   | 05   | 14   | 03   | 02   | 12   | 20   | 21   |
| 0x09 | 22   | 15   | 01   | 26   | 15   | 07   | 50   | 09   | 57   | 07   |      |      |      |      |      |      |
| 0x0A |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 0x0B |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 0x0C |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 0x0D |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 0x0E |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 0x0F |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

### \*Model Name(Hex): LGTV

| Chassis | MODEL NAME(HEX)                                    |
|---------|----------------------------------------------------|
| LD22E   | 00 00 00 FC 00 4C 47 20 54 56 0A 20 20 20 20 20 20 |

### \*Checksum(LG TV): Changeable by total EDID data.

|       | ①  | ②  | ③  |
|-------|----|----|----|
| HDMI1 | 9D | 49 | X  |
| HDMI2 | 9D | 39 | X  |
| HDMI3 | 9D | 29 | X  |
| HDMI4 | 9D | 19 | X  |
| RGB   | X  | X  | 80 |

## \*Vendor Specific(HDMI)DATA

| INPUT | MODEL NAME(HEX)                                                            |
|-------|----------------------------------------------------------------------------|
| HDMI1 | 78 03 0C 00 10 00 B8 2D 20 C0 0E 01 40 0A 3C 08 10 18 10 98 10 58 10 38 10 |
| HDMI2 | 78 03 0C 00 20 00 B8 2D 20 C0 0E 01 40 0A 3C 08 10 18 10 98 10 58 10 38 10 |
| HDMI3 | 78 03 0C 00 30 00 B8 2D 20 C0 0E 01 40 0A 3C 08 10 18 10 98 10 58 10 38 10 |
| HDMI4 | 78 03 0C 00 40 00 B8 2D 20 C0 0E 01 40 0A 3C 08 10 18 10 98 10 58 10 38 10 |

## 5.3 White Balance Adjustment

### 5.3.1 Overview

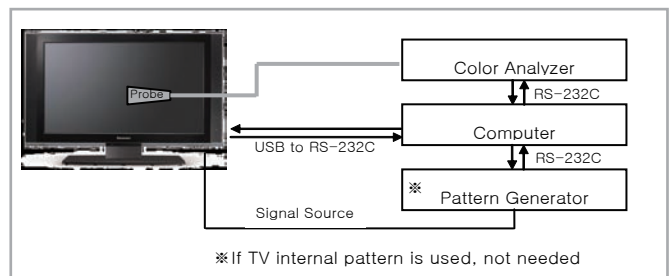
- W/B adj. Objective & How-it-works
- Objective: To reduce each Panel's W/B deviation
- How-it-works: When R/G/B gain in the OSD is at 192, it means the panel is at its Full Dynamic Range. In order to prevent saturation of Full Dynamic range and data, one of R/G/B is fixed at 192, and the other two is lowered to find the desired value.
- Adj. condition : normal temperature
  - 1) Surrounding Temperature: 25±5℃
  - 2) Warm-up time: About 5 Min
  - 3) Surrounding Humidity: 20% ~ 80%

### 5.3.2 Equipment

- 1) Color Analyzer: CA-210 (LED Module : CH 14)
  - 2) Adj. Computer(During auto adj., RS-232C protocol is needed)
  - 3) Adjust Remocon
  - 4) Video Signal Generator MSPG-925F 720p/204-Gray(Model:217, Pattern:49)
- Only when internal pattern is not available

•Color Analyzer Matrix should be calibrated using CS-100.

### 5.3.3 Equipment connection MAP



### 5.3.4 Adj. Command (Protocol)

<Command Format>

START 6E A 50 A LEN A 03 A CMD A 00 A VAL A CS A STOP

- LEN: Number of Data Byte to be sent
  - CMD: Command
  - VAL: FOS Data value
  - CS: Checksum of sent data
  - A: Acknowledge
- Ex) [Send: JA\_00\_DD] / [Ack: A\_00\_okDDX]

•RS-232C Command used during auto-adj.



| GP4 | Aging time<br>(Min) | Cool |     | Medium |     | Warm |     |
|-----|---------------------|------|-----|--------|-----|------|-----|
|     |                     | x    | y   | x      | y   | x    | y   |
|     |                     | 269  | 273 | 285    | 293 | 313  | 329 |
| 1   | 0-2                 | 280  | 287 | 296    | 307 | 320  | 337 |
| 2   | 3-5                 | 279  | 285 | 295    | 305 | 319  | 335 |
| 3   | 6-9                 | 277  | 284 | 293    | 304 | 317  | 334 |
| 4   | 10-19               | 276  | 283 | 292    | 303 | 316  | 333 |
| 5   | 20-35               | 274  | 280 | 290    | 300 | 314  | 330 |
| 6   | 36-49               | 272  | 277 | 288    | 297 | 312  | 327 |
| 7   | 50-79               | 271  | 275 | 287    | 295 | 311  | 325 |
| 8   | 80-119              | 270  | 274 | 286    | 294 | 310  | 324 |
| 9   | Over 120            | 269  | 273 | 285    | 293 | 309  | 323 |

## 5.4 EYE-Q function check

- Step 1) Turn on TV
- Step 2) Press EYE key of Adj. R/C
- Step 3) Cover the Eye Q II sensor on the front of the using your hand and wait for 6 seconds
- Step 4) Confirm that R/G/B value is lower than 10 of the "Raw Data (Sensor data, Back light)". If after 6 seconds, R/G/B value is not lower than 10, replace Eye Q II sensor
- Step 5) Remove your hand from the Eye Q II sensor and wait for 6 seconds
- Step 6) Confirm that "ok" pop up. s  
If change is not seen, replace Eye Q II sensor.



## 5.5 Local Dimming Function Check

- Step 1) Turn on TV
- Step 2) At the Local Dimming mode, module Edge Backlight moving right to left  
Back light of IOP module moving
- Step 3) confirm the Local Dimming mode
- Step 4) Press "exit" Key.



## 5.6 Magic Motion Remocon test

- equipment : RF Remocon for test, IR-KEY-Code Remocon for test
- You must confirm the battery power of RF-Remocon before test (recommend that change the battery per every lot)
- Sequence (test)
  - a)if you select the 'start key(OK)' on the controller, you can pairing with the TV SET.
  - b)You can check the cursor on the TV Screen, when select the 'OK Key' on the controller
  - c) You must remove the pairing with the TV Set by 'Mute + OK Key' on the controller.

## 5.7 3D function test

(Pattern Generator MSHG-600, MSPG-6100 [SUPPORT HDMI1.4])

\* HDMI mode NO. 872 , pattern No.83

- 1) Please input 3D test pattern like below (HDMI mode NO. 872 , pattern No.83)



Fig.1  
<HDMI Mode 872번, Pattern No. 83>

2. When 3D OSD appear automatically , then select green button.



Fig.3  
<OK Key>

3. Don't wear a 3D Glasses, Check the picture like below .



Fig.2  
<3D Mode 진입 후 화면>  
\* 안경을 착용하지 않은 상태임.

## 5.8 3D Depth function TEST

## 5.9 Wi-Fi Test(LM6200 not support Wi-Fi)

## 5.10 LNB voltage and 22KHz tone check (only for DVB-S/S2 model) Test method

1. Set TV in Adj. mode using POWER ON.
2. Connect cable between satellite ANT and test JIG.
4. Press Yellow Key (ETC+SWAP) in Adj Remocon to make LNB on.
5. check LED light 'ON' at 18V menu.
6. check LED light 'ON' at 22KHz tone menu.
7. Press Blue Key (ETC+PIP INPUT) in Adj Remocon to make LNB off.
8. check LED light 'OFF' at 18V menu.
9. check LED light 'OFF' at 22KHz tone menu.

Test result

1. After press LNB On key, '18V LED' and '22KHz tone LED' should be ON.
2. After press LNB OFF key, '18V LED' and '22KHz tone LED' should be OFF.

## 5.11 Option selection per country

### 5.11.1 Overview

- Option selection is only done for models in Non-EU

### 5.11.2 Method

- 1) Press ADJ key on the Adj. R/C, then select Country Group Meun
- 2) Depending on destination, select Country Group Code 04 or Country Group EU then on the lower Country option, select US, CA, MX. Selection is done using +, - or  $\square\square$  KEY.

## 6.0 Tool Option selection

- Method: Press Adj. key on the Adj. R/C, then select Tool option.

### 6.1 Ship-out mode check (In-stop)

- After final inspection, press In-Stop key of the Adj. R/C and check that the unit goes to Stand-by mode.

## 6.2 GND and Internal Pressure check

### 6.2.1 Method

- 1) GND & Internal Pressure auto-check preparation
  - Check that Power Cord is fully inserted to the SET.
 (If loose, re-insert)
- 2) Perform GND & Internal Pressure auto-check
  - Unit fully inserted Power cord, Antenna cable and A/V arrive to the auto-check process.
- Connect D-terminal to AV JACK TESTER
- Auto CONTROLLER(GWS103-4) ON
- Perform GND TEST
  - If NG, Buzzer will sound to inform the operator.
  - If OK, changeover to I/P check automatically.
 (Remove CORD, A/V form AV JACK BOX)
- Perform I/P test
  - If NG, Buzzer will sound to inform the operator.
  - If OK, Good lamp will lit up and the stopper will allow the pallet to move on to next process.

### 6.2.2 Checkpoint

- TEST voltage
  - GND: 1.5KV/min at 100mA
  - SIGNAL: 3KV/min at 100mA
- TEST time: 1 second
- TEST POINT
  - GND TEST = POWER CORD GND & SIGNAL CABLE METAL GND
  - Internal Pressure TEST = POWER CORD GND & LIVE & NEUTRAL
- LEAKAGE CURRENT: At 0.5mArms.

## 7. Audio

| No | Item                                                        | Min | Typ  | Max  | Unit | Remark                               |
|----|-------------------------------------------------------------|-----|------|------|------|--------------------------------------|
| 1. | Audio practical max Output, L/R (Distortion=10% max Output) | 9   | 10   | 12   | W    | EQ Off<br>AVL Off<br>Clear Voice Off |
|    |                                                             |     | 8.10 | 10.8 | Vrms |                                      |
| 2. | Speaker (8Ω Impedance)                                      |     | 10   | 12   | W    | EQ On<br>AVL On<br>Clear Voice On    |

Measurement condition:

1. RF input: Mono, 1KHz sine wave signal, 100% Modulation
2. CVBS, Component: 1KHz sine wave signal 0.5Vrms
3. RGB PC: 1KHz sine wave signal 0.7Vrms.

## 8.1 SET Factoring Condition

| No. | Item               | Condition   | Remark        |
|-----|--------------------|-------------|---------------|
| 1.  | Power              | Off         |               |
| 2.  | Volume Level       | 10          |               |
| 3.  | Main Picture Input | DTV         | DTV&ATV       |
| 4.  | Main Last Channel  | N.A.        |               |
| 5.  | Mute               | Off         |               |
| 6.  | ARC                | 16:9(DTV)   |               |
|     | Energy Saving      | Auto        |               |
|     | 3D Settings        |             |               |
|     |                    | Standard    |               |
|     |                    | Backlight   | Energy Saving |
|     |                    | Contrast    | 100           |
| 7.  | PICTURE            | Brightness  | 50            |
|     |                    | Sharpness   | 25            |
|     |                    | Colour      | 60            |
|     |                    | Tint        | 0             |
|     |                    | Colour Temp | 0             |

|    |         |               |             |                      |        |
|----|---------|---------------|-------------|----------------------|--------|
| 7. | PICTURE | Energy Saving | Auto        |                      |        |
|    |         | 3D Settings   |             |                      |        |
|    |         | Picture Mode  | Standard    |                      |        |
|    |         |               | Backlight   | Energy Saving        |        |
|    |         |               | Contrast    | 100                  |        |
|    |         |               | Brightness  | 50                   |        |
|    |         |               | Sharpness   | 25                   |        |
|    |         |               | Colour      | 60                   |        |
|    |         |               | Tint        | 0                    |        |
|    |         |               | Colour Temp | 0                    |        |
|    |         |               |             | Dynamic Contrast     | Medium |
|    |         |               |             | Dynamic Colour       | Low    |
|    |         |               |             | Clear White          | off    |
|    |         |               |             | Skin Colour          | 0      |
|    |         |               |             | Grass Color          | 0      |
|    |         |               |             | Sky Color            | 0      |
|    |         |               |             | Noise Reduction      | Low    |
|    |         |               |             | Super Resolution     | On     |
|    |         |               |             | MPEG Noise Reduction | Medium |
|    |         |               |             | Gamma                | Medium |
|    |         |               |             | Black Level          | Auto   |
|    |         |               |             | Eye Care             | Low    |
|    |         |               |             | Real Cinema          | On     |
|    |         |               |             | Colour Gamut         | Wide   |
|    |         |               | xvYCC       | Off                  |        |
|    |         | Picture Reset |             |                      |        |
|    |         | Aspect Ratio  | 16:9        |                      |        |

|    |       |                   |                   |        |                                                                      |
|----|-------|-------------------|-------------------|--------|----------------------------------------------------------------------|
| 8. | AUDIO | Sound Mode        | Standard          |        | Stanard<br>Music<br>Cinema<br>Sport<br>Game<br>Vivid<br>User setting |
|    |       | User EQ           |                   |        |                                                                      |
|    |       | Volume Mode       | Auto Volume       | Off    |                                                                      |
|    |       |                   | Volume Control    | Medium |                                                                      |
|    |       | Natural Sound     | Dynamic EQ        | On     |                                                                      |
|    |       |                   | Bass Enhancer     | On     |                                                                      |
|    |       | Sound Optimizer   | Normal            |        |                                                                      |
|    |       | Infinite Surround | On                |        |                                                                      |
|    |       | Clear Voice II    | Off               |        |                                                                      |
|    |       | AV sync.          | Off               |        |                                                                      |
|    |       | DTV Audio Setting | Auto              |        |                                                                      |
|    |       | Audio Setting     | ARC Mode          | Off    |                                                                      |
|    |       |                   | Balance           | 0      |                                                                      |
|    |       |                   | TV Speaker        | On     |                                                                      |
|    |       |                   | Digital Audio Out | PCM    |                                                                      |

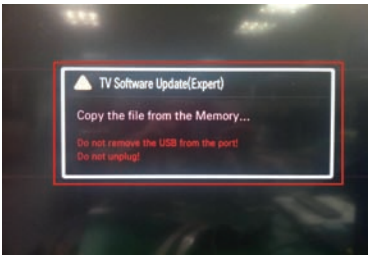
|    |                    |                |              |  |
|----|--------------------|----------------|--------------|--|
| 9. | SETUP<br>(DTV&ATV) | Auto Tuning    |              |  |
|    |                    | Manual Tuning  | DTV/TV       |  |
|    |                    | Programme Edit | DTV/Radio/TV |  |
|    |                    | CI information | Module       |  |

|     |      |                   |         |              |
|-----|------|-------------------|---------|--------------|
| 10. | Time | Clock             | -- : -- | User control |
|     |      | Off time          | Off     |              |
|     |      | On time           | Off     |              |
|     |      | Sleep Timer       | Off     |              |
|     |      | Automatic Standby | 4 hours |              |

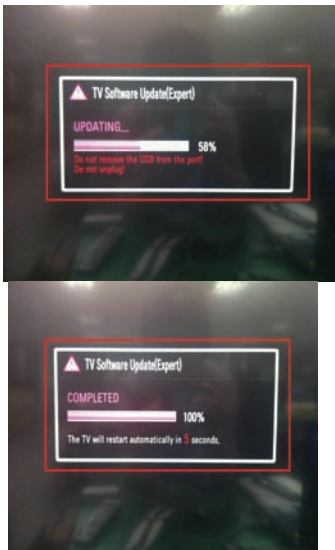
|                     |         |                           |                                            |                             |  |  |
|---------------------|---------|---------------------------|--------------------------------------------|-----------------------------|--|--|
| 11.                 | LOCK    | Set Password              | New       * * * * *<br>Confirm   * * * * * |                             |  |  |
|                     |         | Lock System               | Off                                        |                             |  |  |
|                     |         |                           | Block Programme                            | DTV/RADIO/TV                |  |  |
|                     |         |                           | Parental Guidance                          | Blocking Off                |  |  |
|                     |         |                           | Input Block                                |                             |  |  |
| 12.                 | OPTION  | Language                  | Menu Language                              | English                     |  |  |
|                     |         |                           | Audio Language                             | English                     |  |  |
|                     |         |                           | Subtitle Language                          | English                     |  |  |
|                     |         | Country                   | - -                                        |                             |  |  |
|                     |         | Disability Assistance     | Hard of Hearing                            | Off                         |  |  |
|                     |         |                           | Audio Description                          | Off                         |  |  |
|                     |         |                           | Volume                                     | 0                           |  |  |
|                     |         |                           | Beep                                       | Off                         |  |  |
|                     |         | Power Indicator           | Stand by Light                             | On                          |  |  |
|                     |         |                           | Power Light                                | On                          |  |  |
|                     |         | Pointer                   | Speed                                      | Normal                      |  |  |
|                     |         |                           | Shape                                      | Type D                      |  |  |
|                     |         |                           | Size                                       | Medium                      |  |  |
|                     |         |                           | Alignment                                  | On                          |  |  |
|                     |         | Factory Reset             |                                            |                             |  |  |
|                     |         | Set ID                    | 1                                          |                             |  |  |
|                     |         | Mode Setting              | Home Use                                   |                             |  |  |
|                     |         | 13.                       | Network                                    | Network Connection          |  |  |
|                     |         |                           |                                            | Network Status              |  |  |
|                     |         |                           |                                            | Wi-Fi Direct / Wi-Fi Screen |  |  |
| Smart Share Setting |         |                           |                                            |                             |  |  |
|                     |         |                           |                                            |                             |  |  |
| 14.                 | SUPPORT | Software Update           |                                            |                             |  |  |
|                     |         | Picture Test              |                                            |                             |  |  |
|                     |         | Sound Test                |                                            |                             |  |  |
|                     |         | Signal Test               |                                            |                             |  |  |
|                     |         | Product/Service Info.     |                                            |                             |  |  |
|                     |         | Initialization of Premium |                                            |                             |  |  |

## 8.2 USB S/W Download (option, Service only)

- 1. Put the USB Stick to the USB socket
- 2. Automatically detecting update file in USB Stick
  - If your downloaded program version in USB Stick is Lower, it didn't work.
  - But your downloaded version is Higher, USB data is automatically detecting (Download Version High & Power only mode, Set is automatically Download)
- 3. Show the message "Copying files from memory"



- 4. Updating is starting.



- 5. Updating Completed, The TV will restart automatically
  - 6. If your TV is turned on, check your updated version and Tool option. (explain the Tool option, next stage)
    - \* If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel ecover. if all channel data is cleared, you didn't have a DTV/ATV test on production line.
- \* After downloading, have to adjust TOOL OPTION again.
- 1. Push "IN-START" key in service remote controller.
  - 2. Select "Tool Option 1" and Push "OK" button.
  - 3. Punch in the number. (Each model has their number.)

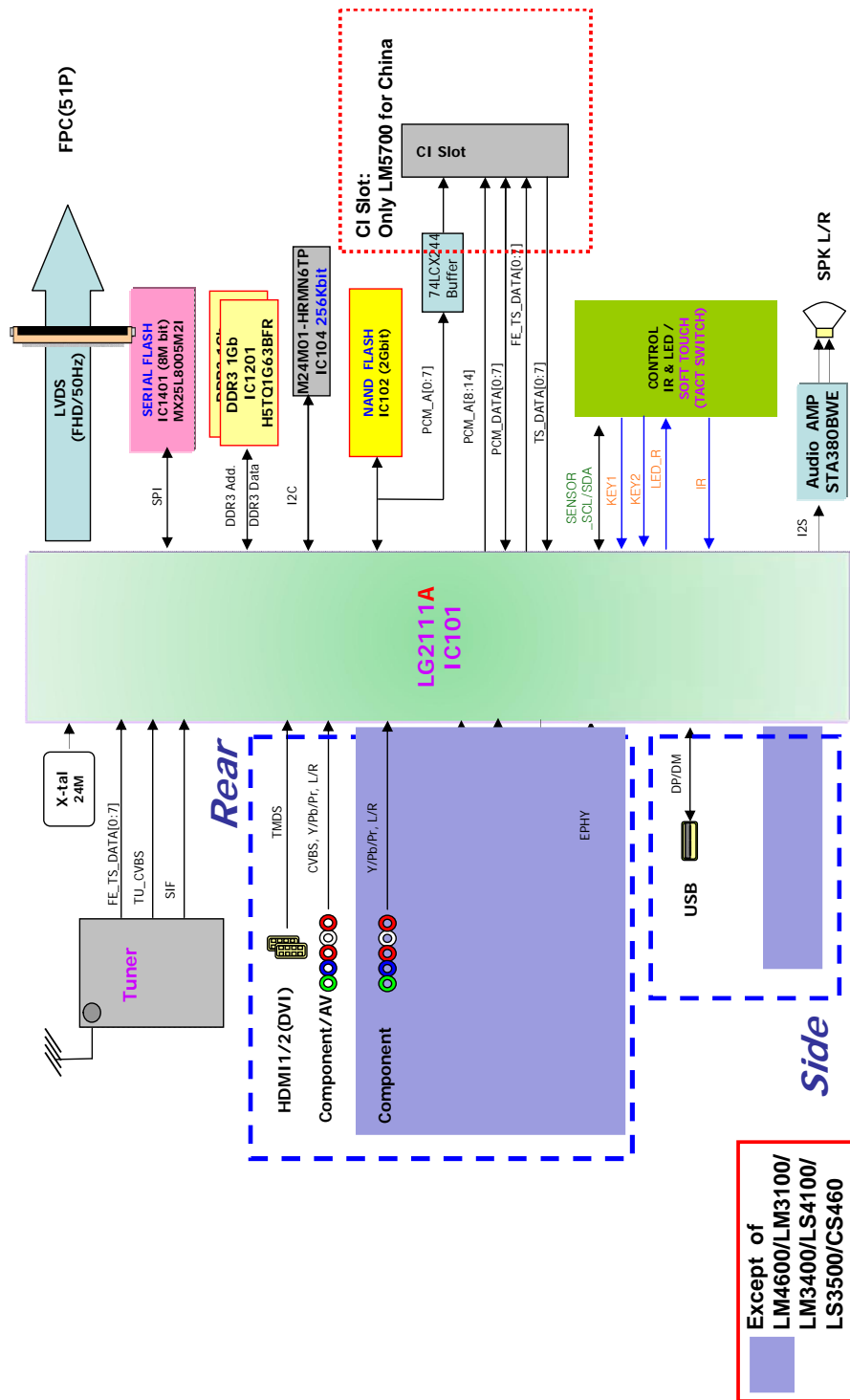
## 9.3 Tool Option selection

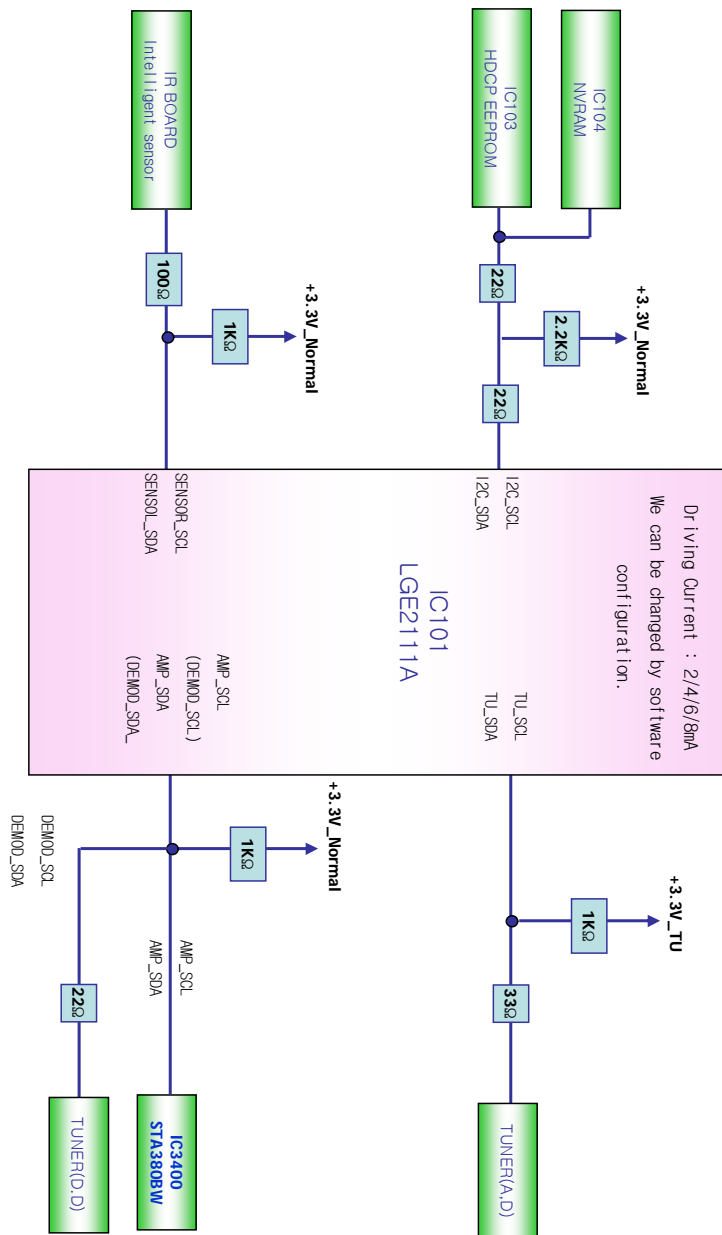
▪ Method: Press Adj. key on the Adj. R/C, then select Tool option.

|             | Area(Code) | Option1 | Option2 | Option3 | Option4 | Option5 | Option6 | Option7 |
|-------------|------------|---------|---------|---------|---------|---------|---------|---------|
| 47LM6200-CC | HK (17)    | 164     | 41675   | 17229   | 37327   | 23191   | 1321    | 6059    |



# BLOCK DIAGRAM

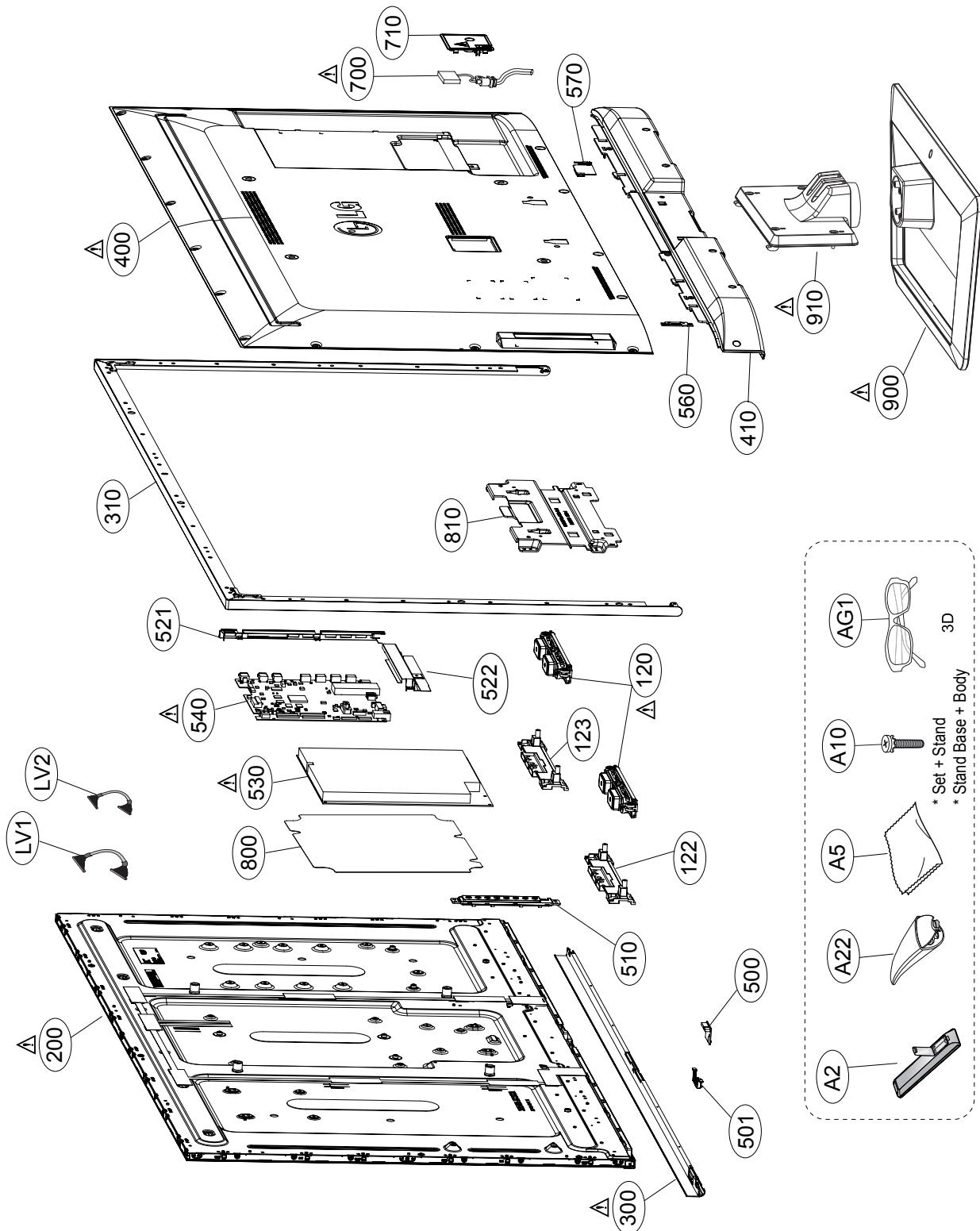




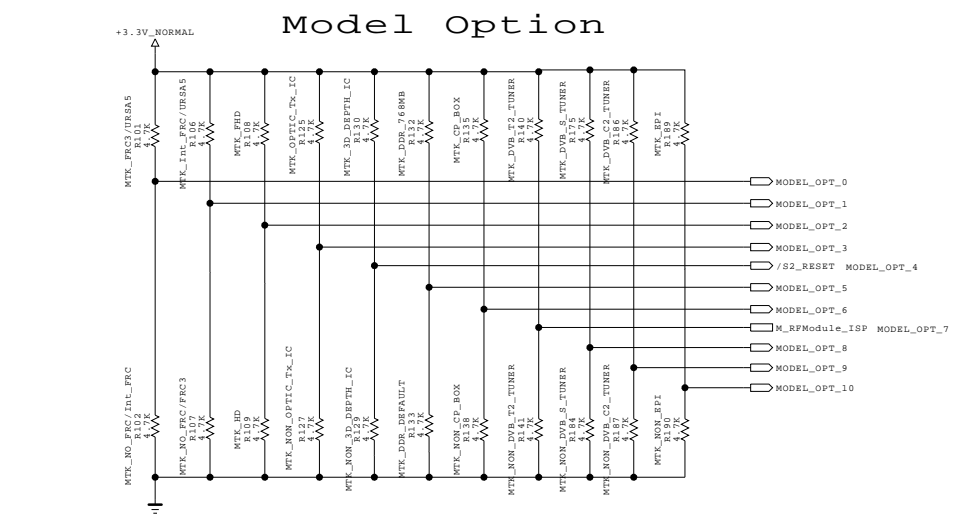
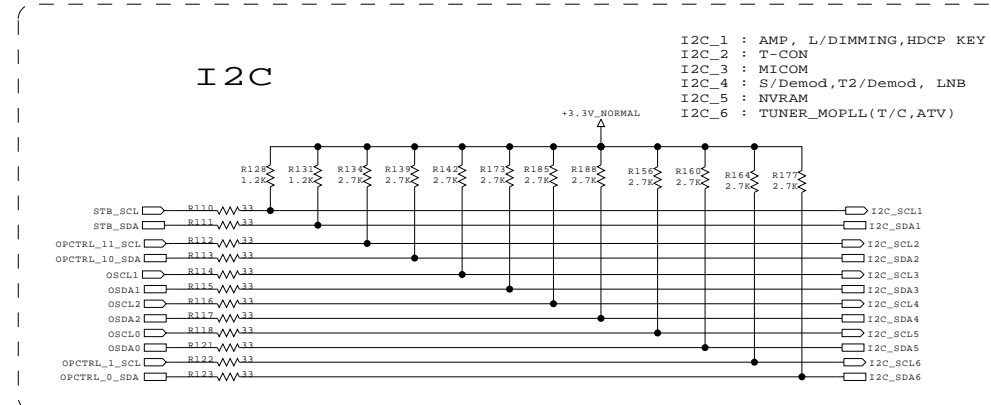
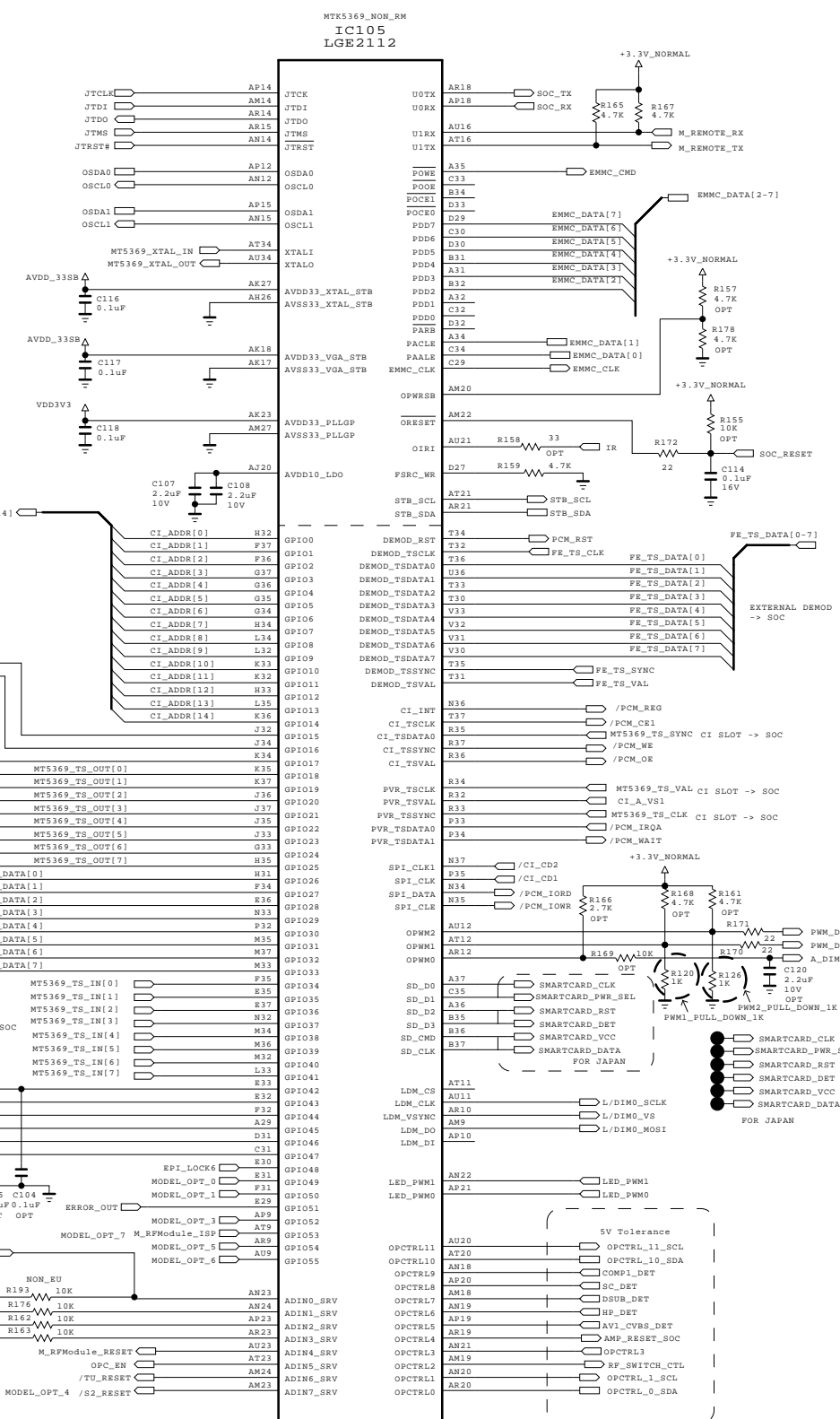
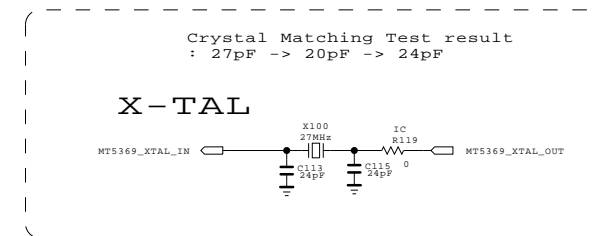
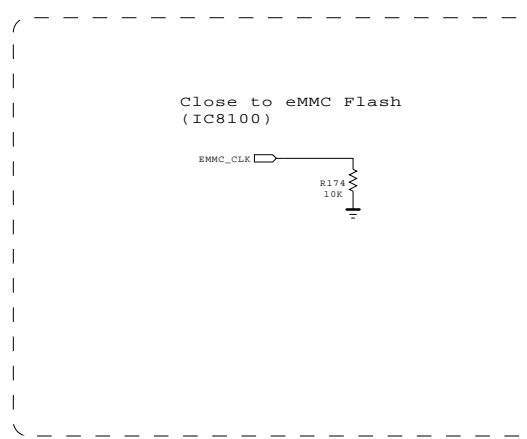
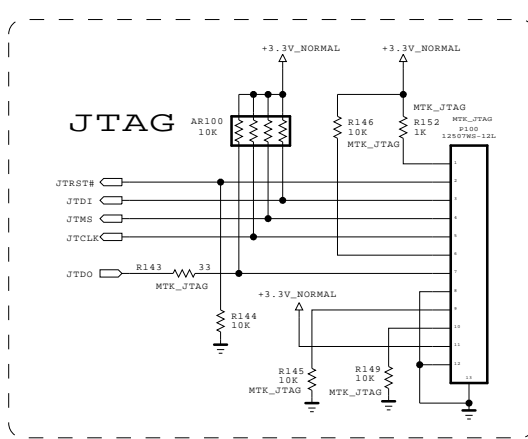
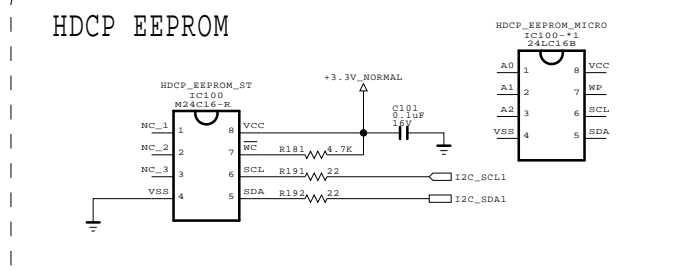
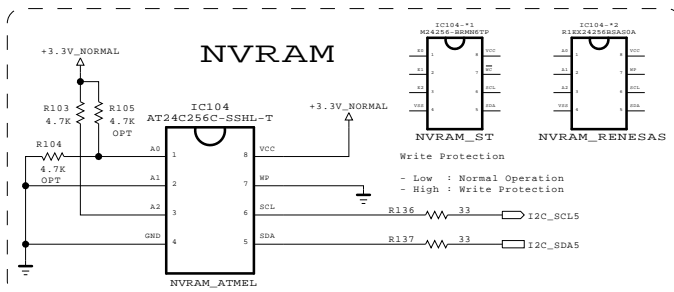
# EXPLODED VIEW

## IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by  $\Delta$  in the Schematic Diagram and EXPLODED VIEW. It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards. Do not modify the original design without permission of manufacturer.



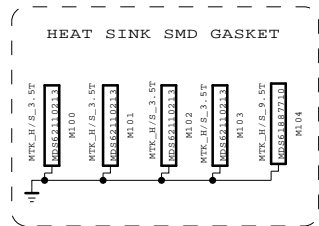
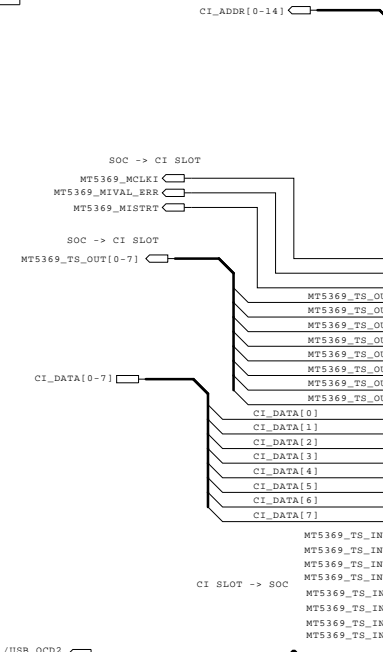
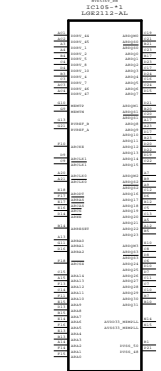
```
EAX6430790* : LD22* / LC22*
EAX6443420* : LT22* / LJ22* / LA22* / LB22*
```





|             | NO_FRC | SoC<br>internal<br>FRC | LG_FRC2 | Reserved |
|-------------|--------|------------------------|---------|----------|
| MODEL_OPT_0 | 0      | 0                      | 1       | 1        |
| MODEL_OPT_1 | 0      | 1                      | 0       | 1        |

|              |          | HIGH        | LOW          |
|--------------|----------|-------------|--------------|
| MODEL_OPT_2  |          | FHD         | HD           |
| MODEL_OPT_3  |          | OPTIC       | NON_OPTIC    |
| MODEL_OPT_4  | 3D DEPTH | 3D_Depth_IC | NON_3D_Depth |
| MODEL_OPT_5  | DDR      | DDR_768MB   | DDR_Default  |
| MODEL_OPT_6  | CF BOX   | Enable      | Disable      |
| MODEL_OPT_7  | T2 Tuner | Support     | Not Support  |
| MODEL_OPT_8  | S Tuner  | Support     | Not Support  |
| MODEL_OPT_9  | Reserved |             | Default      |
| MODEL_OPT_10 | EPI      | Support     | Not Support  |

MODEL OPTION 8 is just for CP Box  
It should not be applied at MD



THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC

SECRET  
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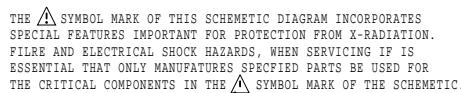
|       |
|-------|
| MODEL |
| BLOCK |

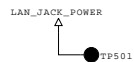
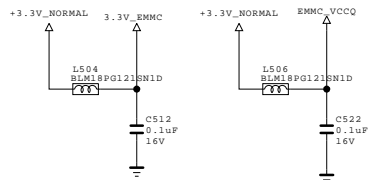
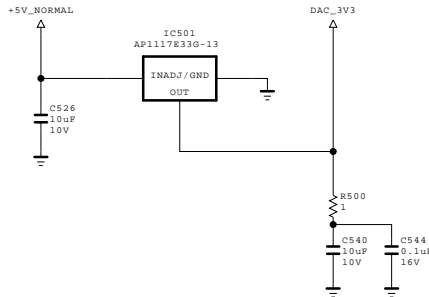
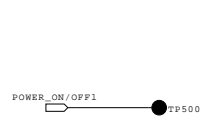
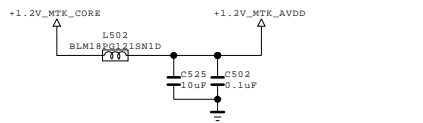
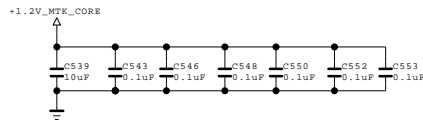
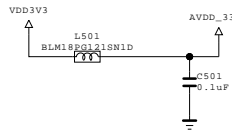
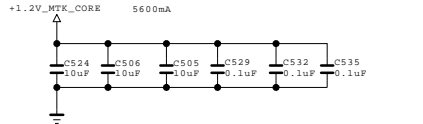
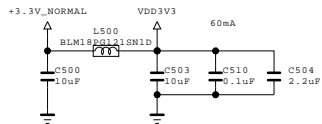
MID\_MAIN\_1

|       |
|-------|
| DATE  |
| SHEET |

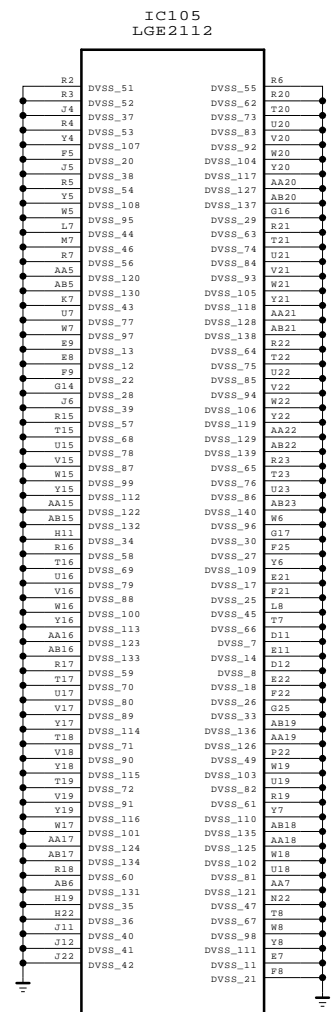
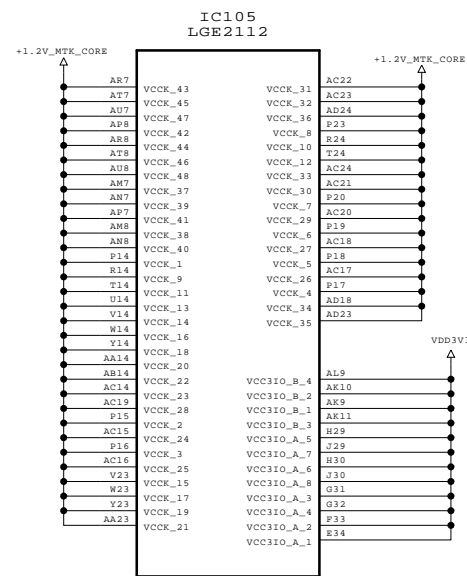
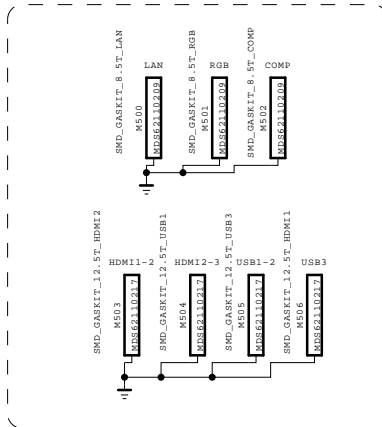
2011.12.09

8

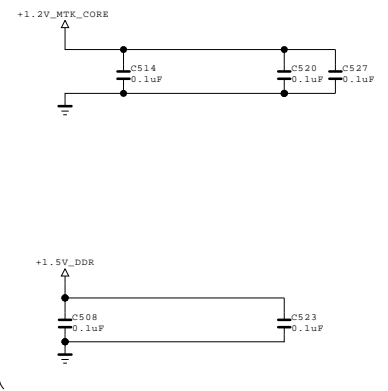




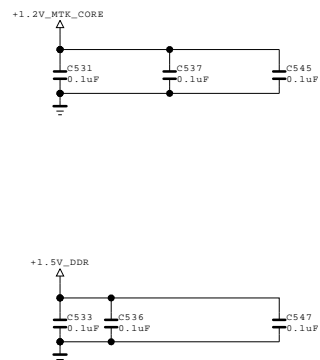
## SMD Gasket





## DECAP FOR SOC (HIDDEN - UCC)



## DECAP FOR SOC (BOTTOM)



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SECRET  
LGElectronics

LG ELECTRONICS

MODEL  
BLOCK

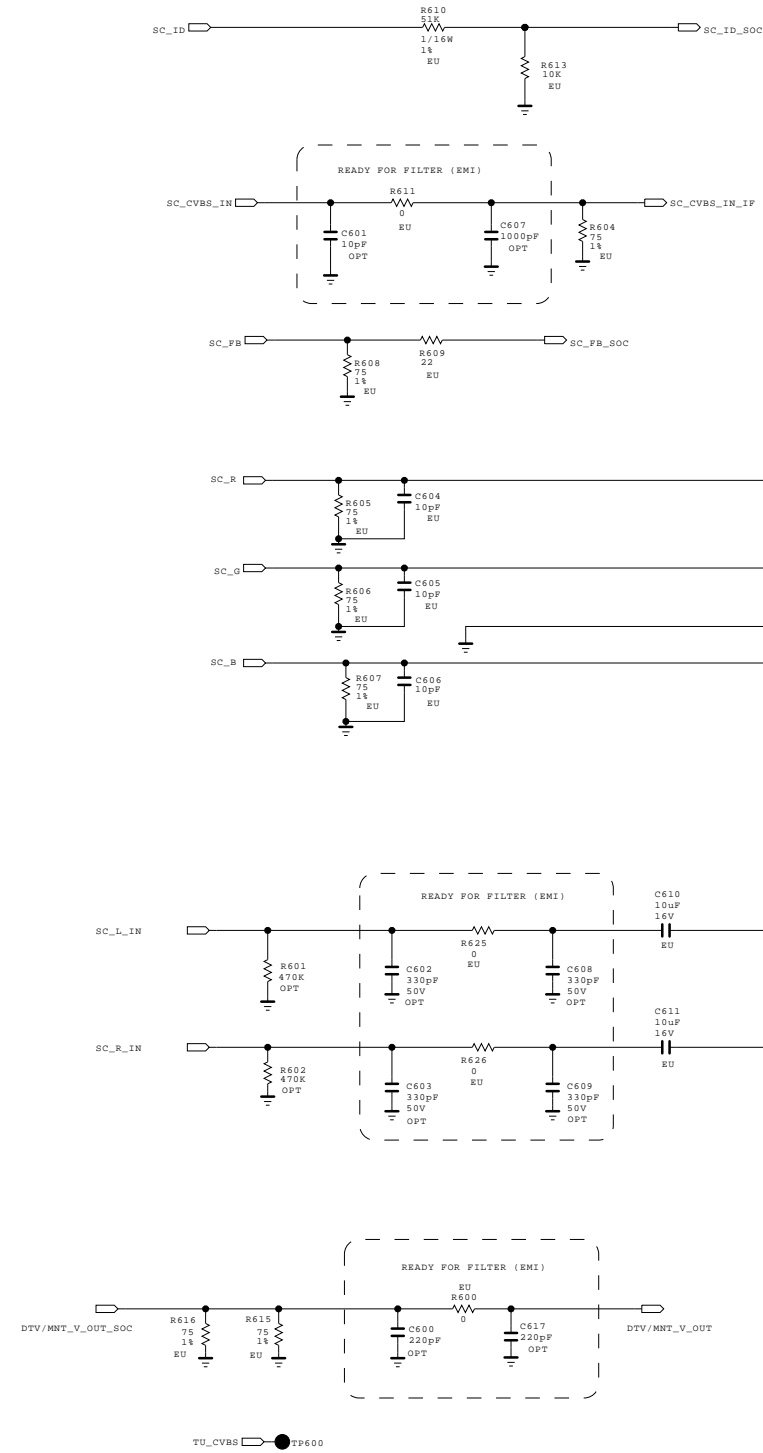
MID\_MAIN\_3

DATE  
SHEET

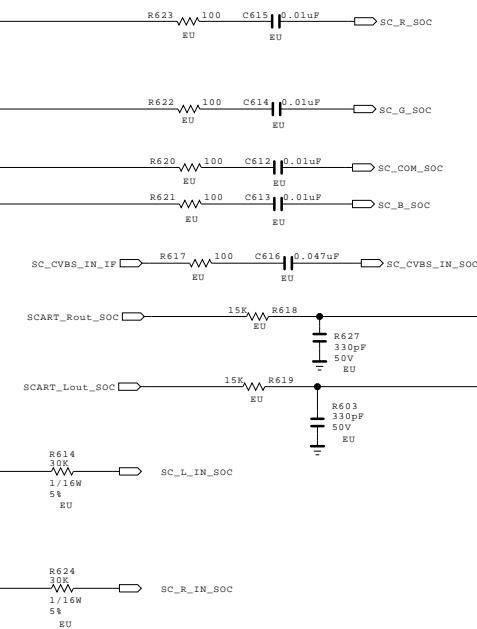
2011.12.09

10

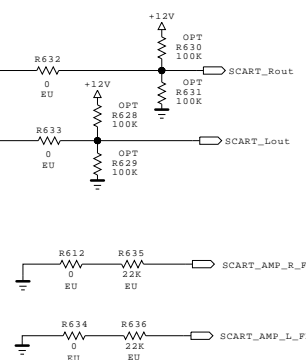
PLACE AT JACK SIDE





PLACE AT MAIN SOC SIDE



PLACE AT IC6000

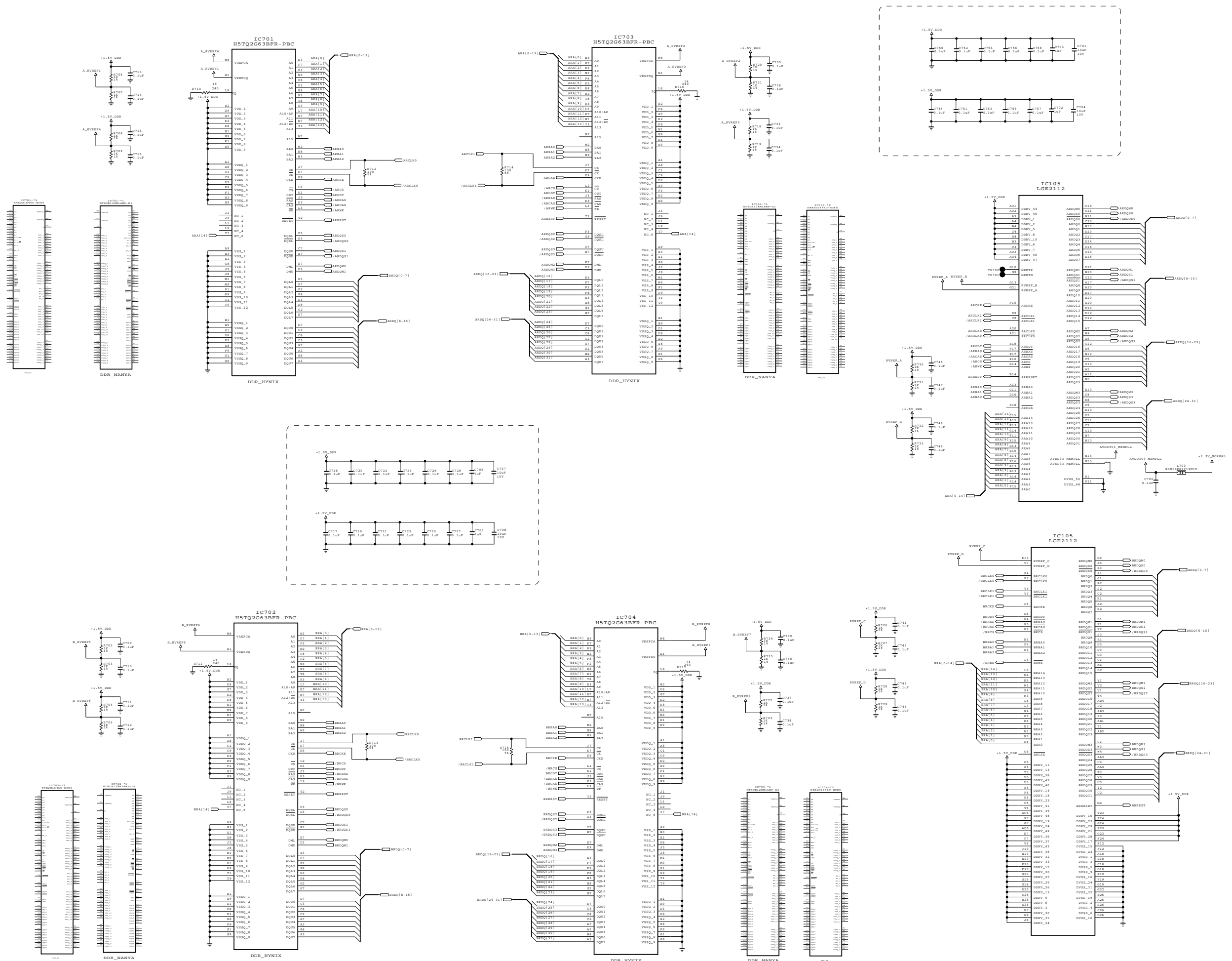




THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

SECRET  
LGElectronics



|       |                |       |            |
|-------|----------------|-------|------------|
| MODEL | MID_MAIN_SCART | DATE  | 2011.11.21 |
| BLOCK |                | SHEET | 11 /       |



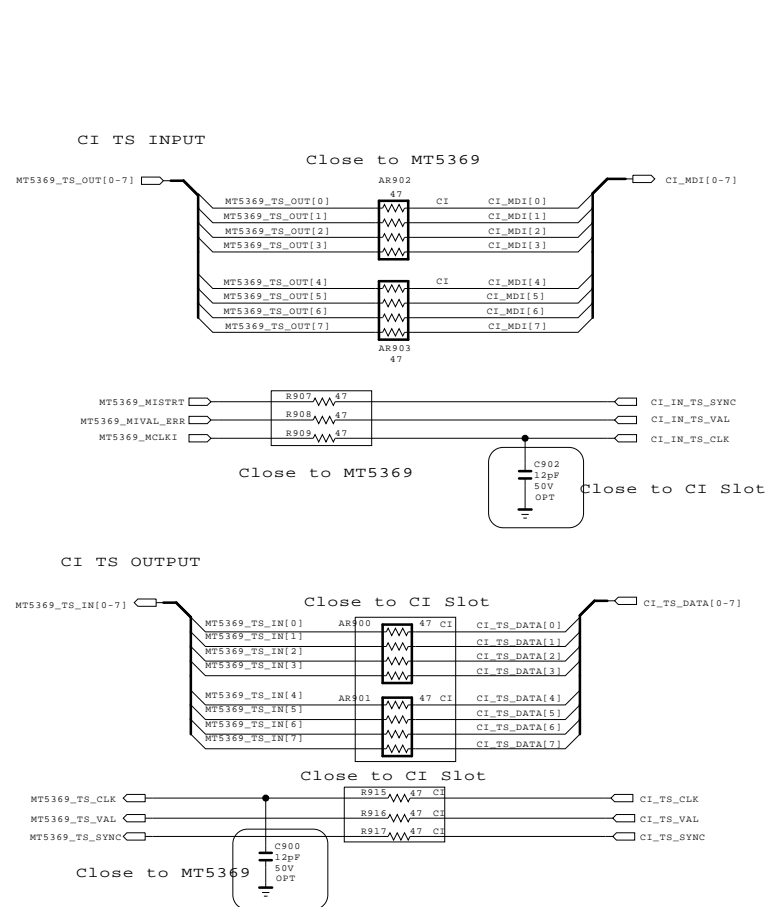
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

SECRET  
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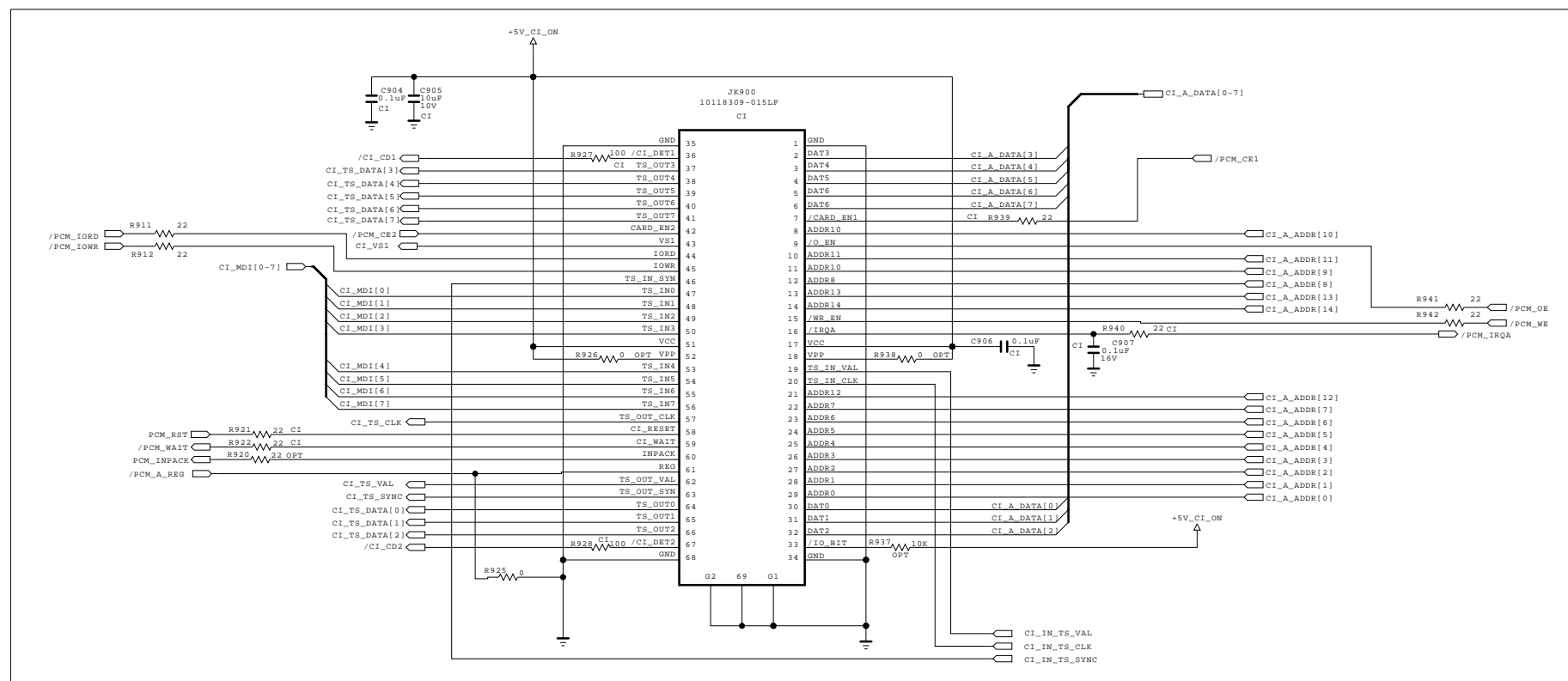
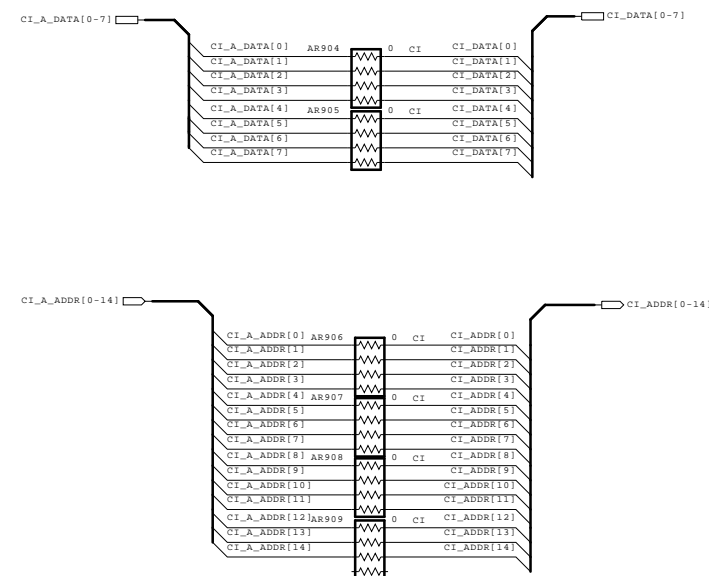
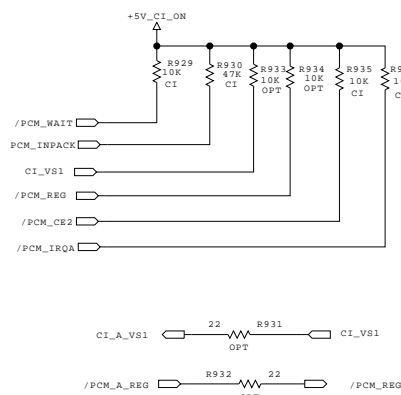
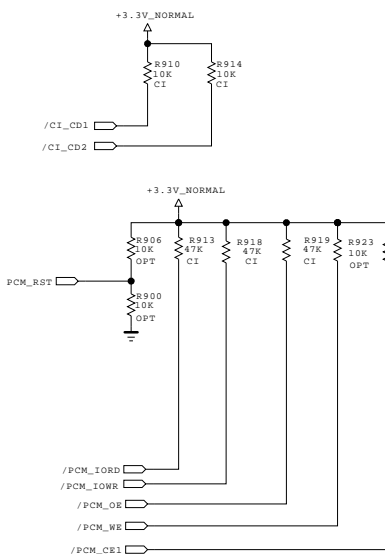
LG ELECTRONICS

|                |               |                  |
|----------------|---------------|------------------|
| MODEL<br>BLOCK | DATE<br>SHEET | 2011.12.09<br>12 |
|----------------|---------------|------------------|



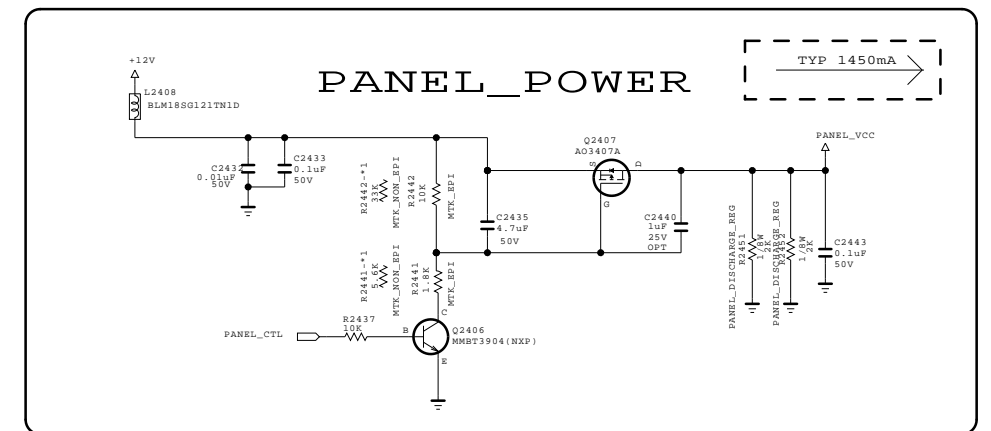


# CI DETECT



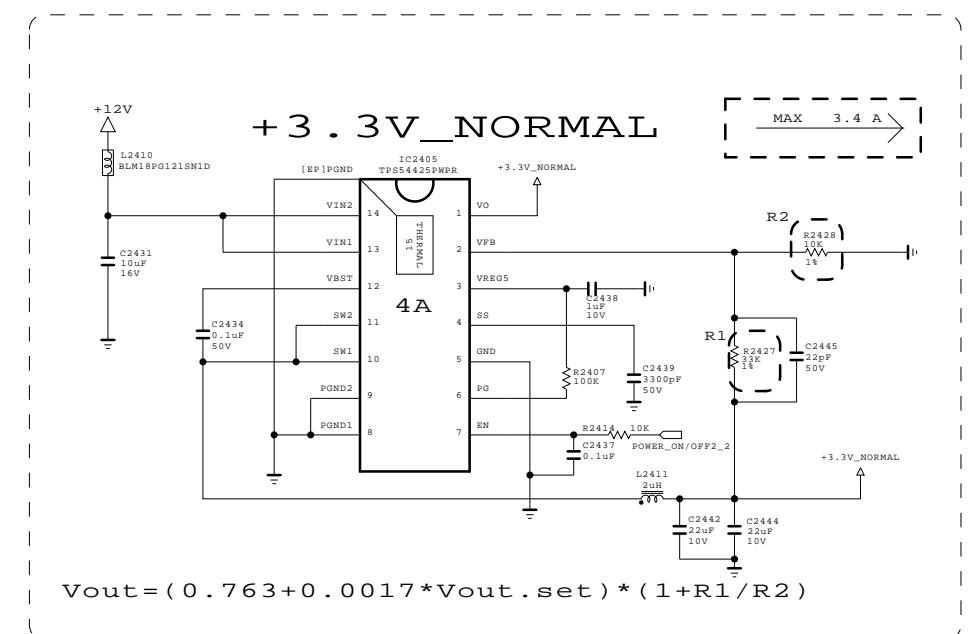
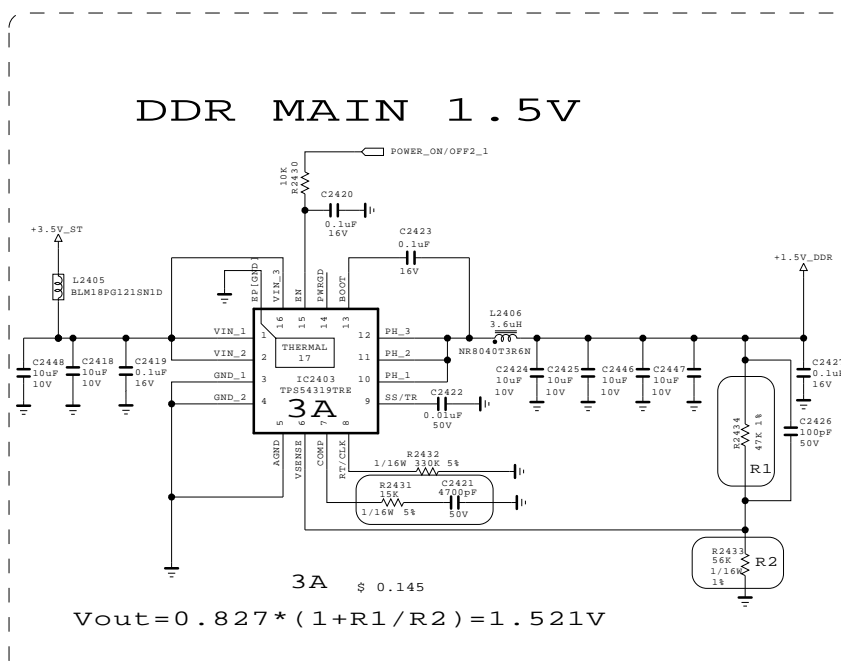
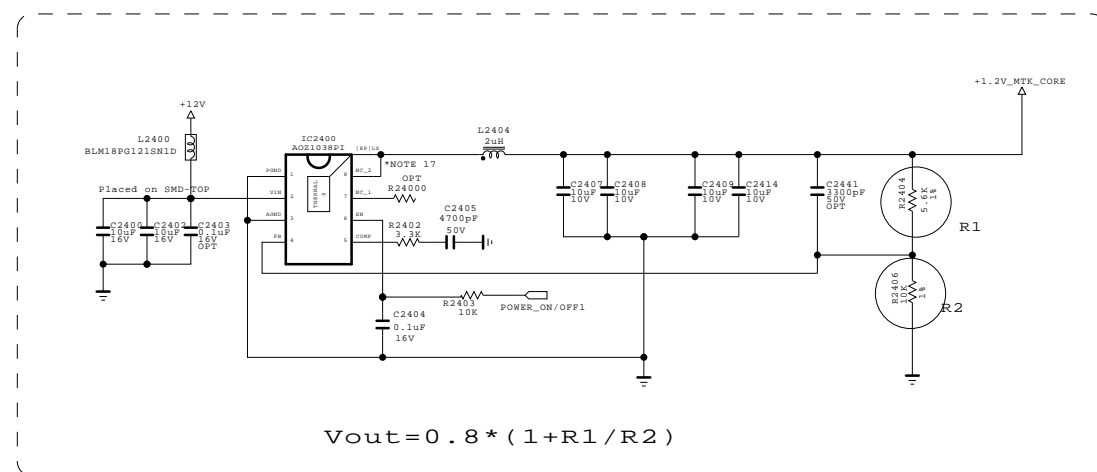
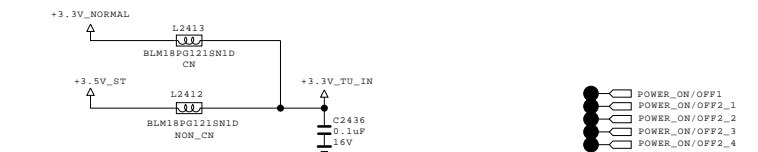
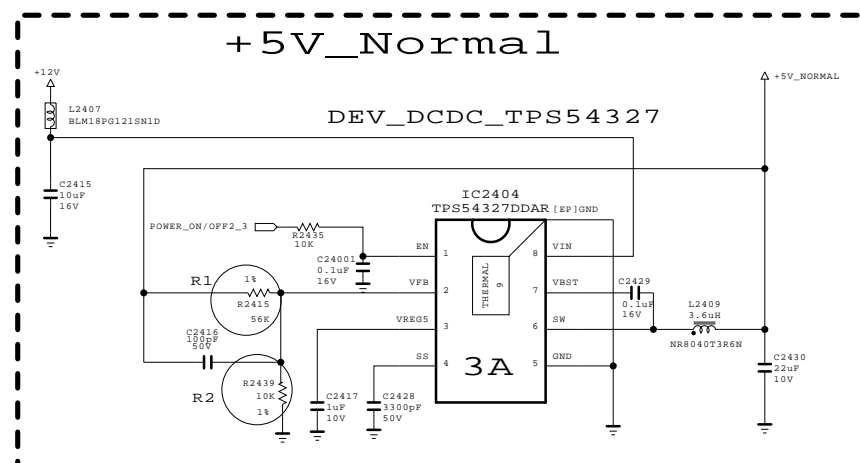
#16/#20/#23  
 LD - GND OR USE  
 LE(N.L.D.) - OPEN  
 LE(L.D.) - USE

POWER\_24\_ERROR\_OUT



On-semi

24V-->3.48V  
12V-->3.58V  
ST\_3.5V-->3.5V



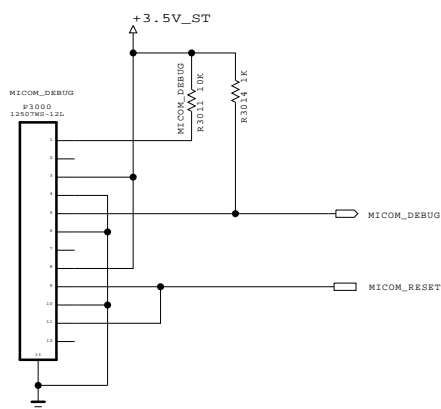
SECRET  
LGElectronics



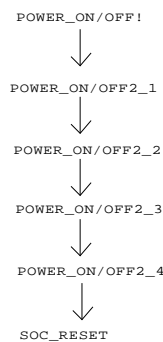
|       |           |       |            |
|-------|-----------|-------|------------|
| MODEL | MID_POWER | DATE  | 2011.11.25 |
| BLOCK |           | SHEET | 24 /       |

## Renesas MICOM

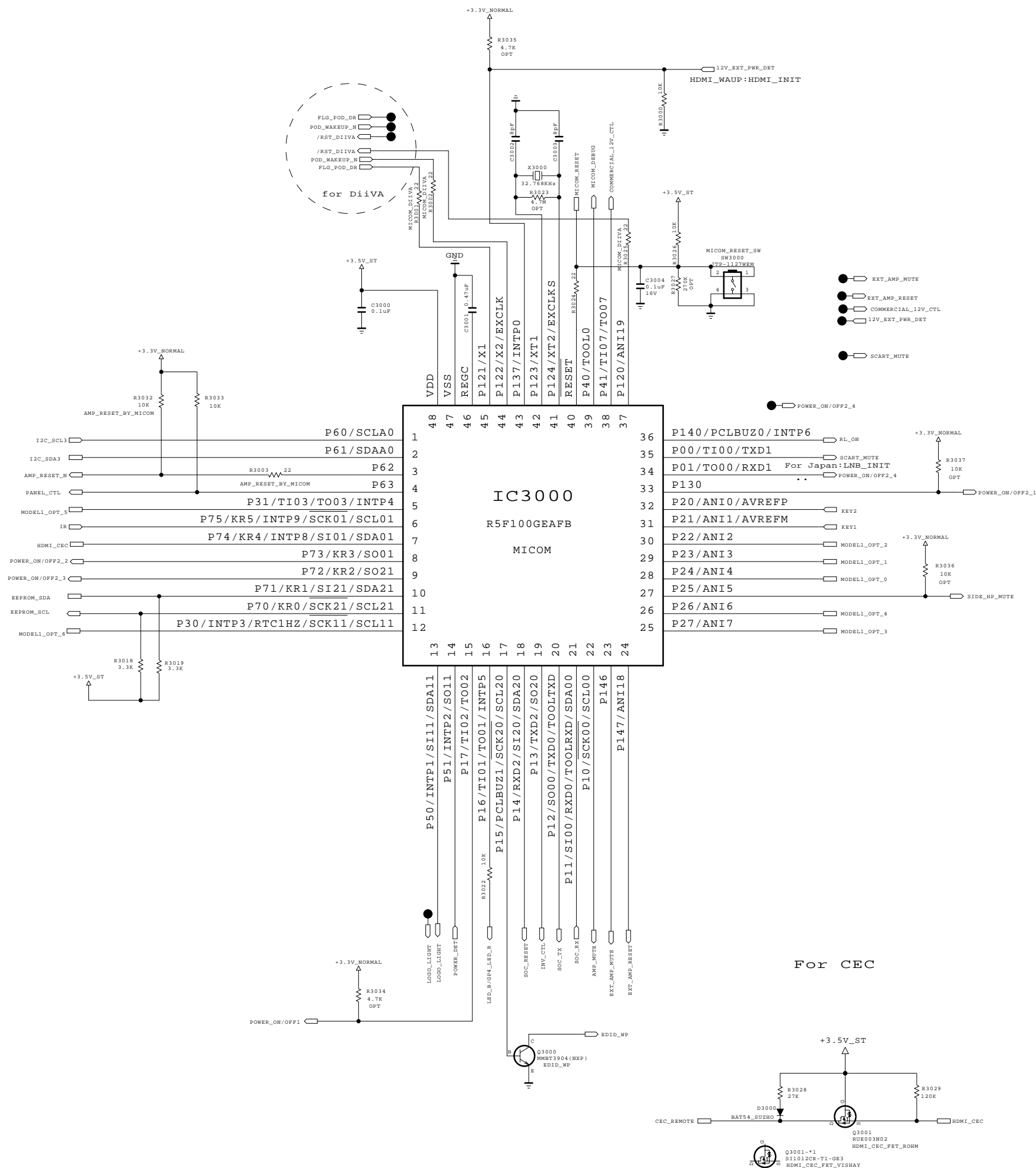
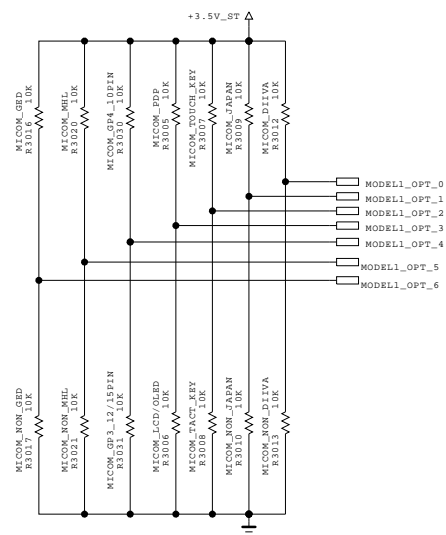
## For Debug



## GP4 High/MID Power SEQUENCE



## MICOM MODEL OPTION



## MICOM MODEL OPTION

|             | 0                                        | 1                               |                |
|-------------|------------------------------------------|---------------------------------|----------------|
| MODEL_OPT_0 | NON DIVA                                 | DIVA                            | For China      |
| MODEL_OPT_1 | NON JAPAN                                | JAPAN                           | For JAPAN      |
| MODEL_OPT_2 | TACT_KEY                                 | TOUCH_KEY                       |                |
| MODEL_OPT_3 | LCD / OLED                               | PDP                             |                |
| MODEL_OPT_4 | IR Wafer<br>12/15Pin<br>(GP3_Soft touch) | IR Wafer<br>10Pin<br>(GP4_TOOL) | For Sample Set |
| MODEL_OPT_5 | NON_MHL                                  | MHL                             | GP4_HIGH       |
| MODEL_OPT_6 | NON_GED                                  | GED                             |                |

## Eye Sensor Option

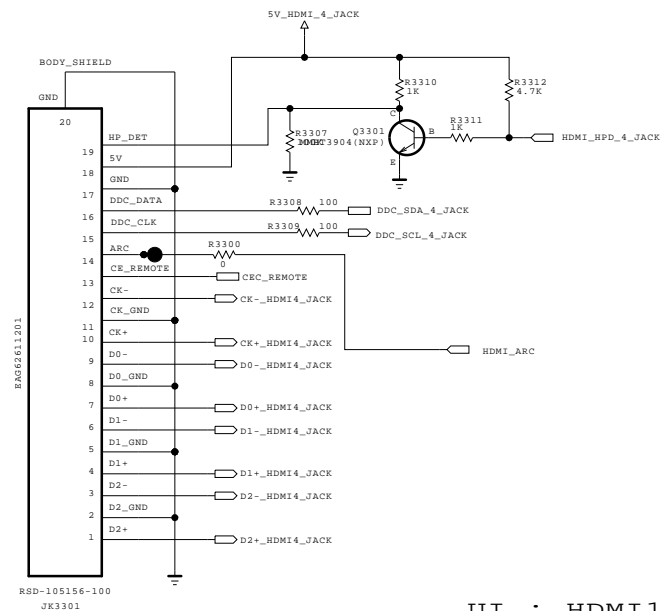
| MODEL_OPT_2 \ MODEL_OPT_4 | 0                                  | 1                                  |
|---------------------------|------------------------------------|------------------------------------|
| 0                         | N/A                                | MC8101_ABOV<br>(TACT_KEY)          |
| 1                         | CM3231_CAPELLA<br>(GP3 Soft touch) | CM3231_CAPELLA<br>(GP4 Soft touch) |

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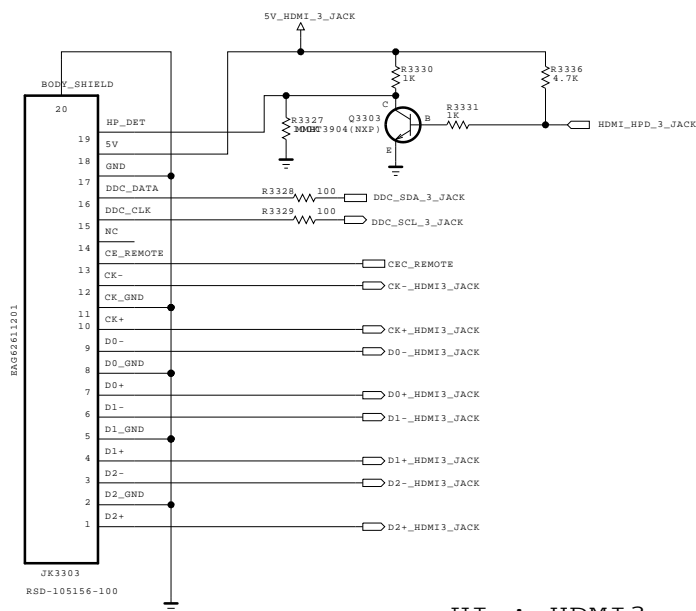
SECRET  
LGElectronics



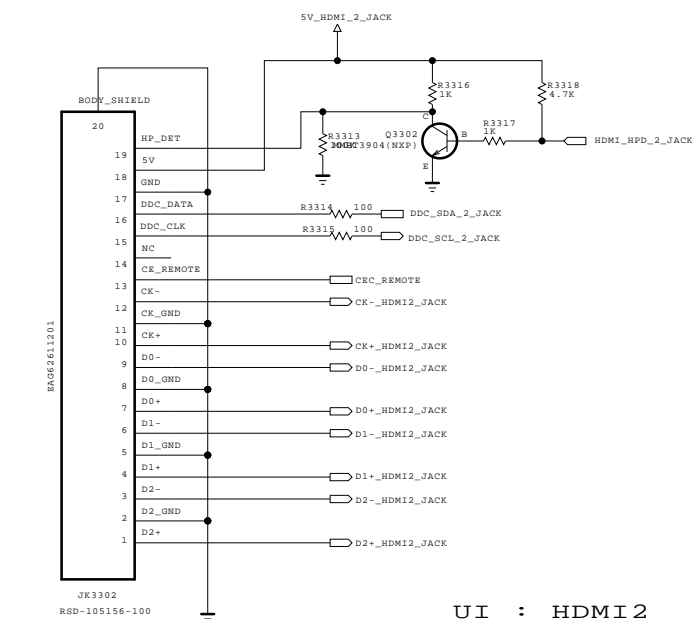
|       |       |       |            |
|-------|-------|-------|------------|
| MODEL |       | DATE  | 2011.11.21 |
| BLOCK | MICOM | SHEET | 30 /       |



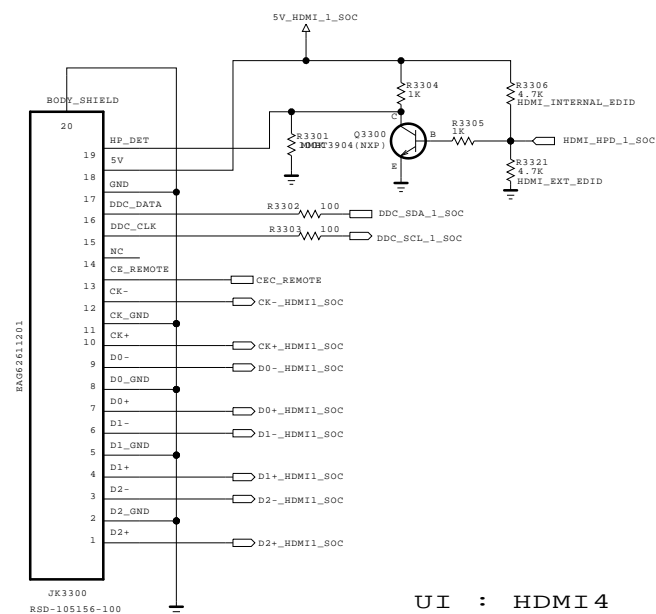
UI : HDMI1



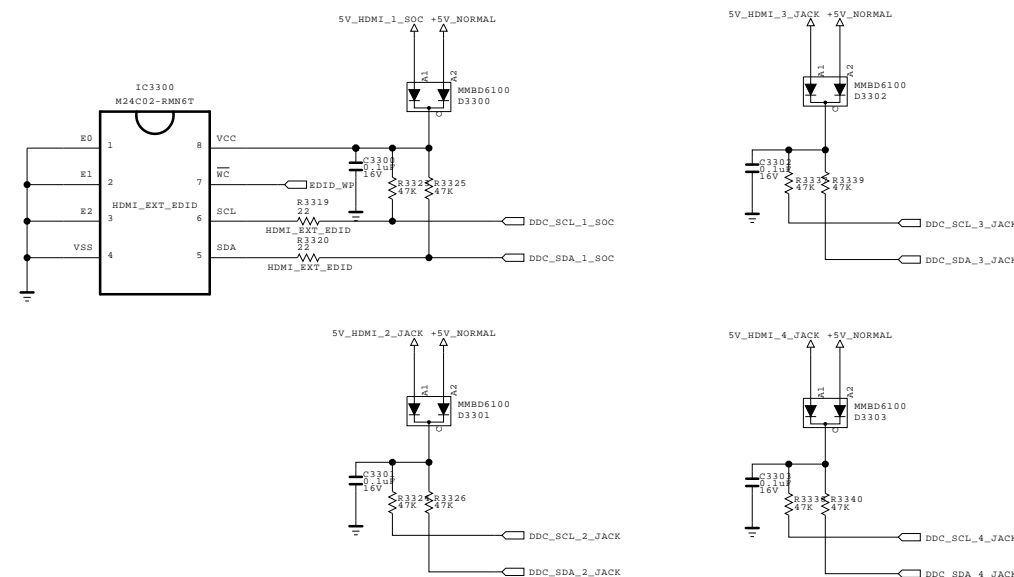
UI : HDMI3





UI : HDMI2



UI : HDMI4



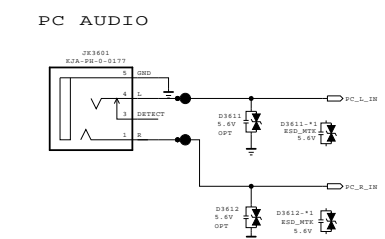
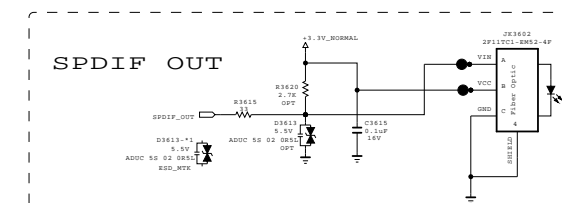
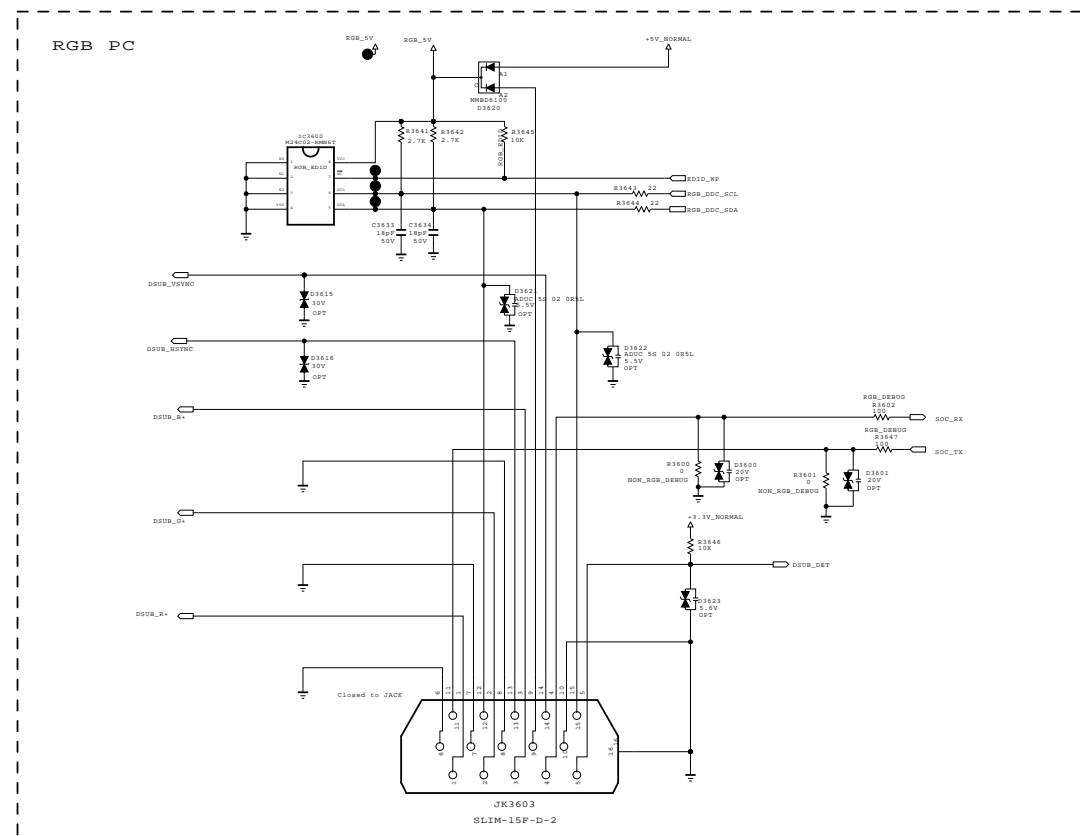
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.



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|       |        |       |            |
|-------|--------|-------|------------|
| MODEL | HDMI 4 | DATE  | 2011.10.29 |
| BLOCK |        | SHEET | 33         |

## RGB / PC AUDIO / SPDIF

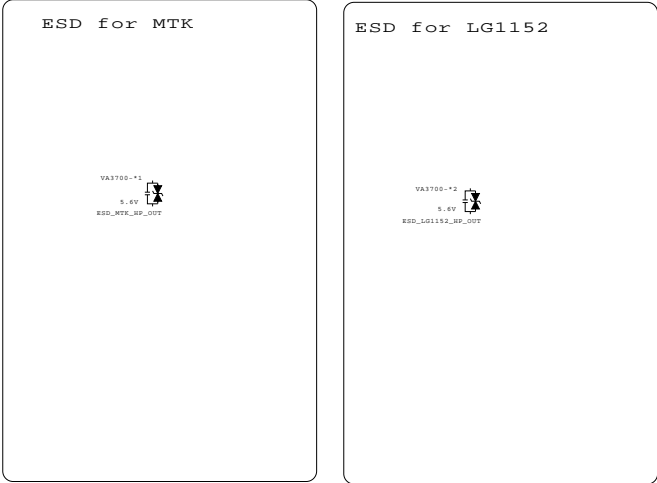


THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

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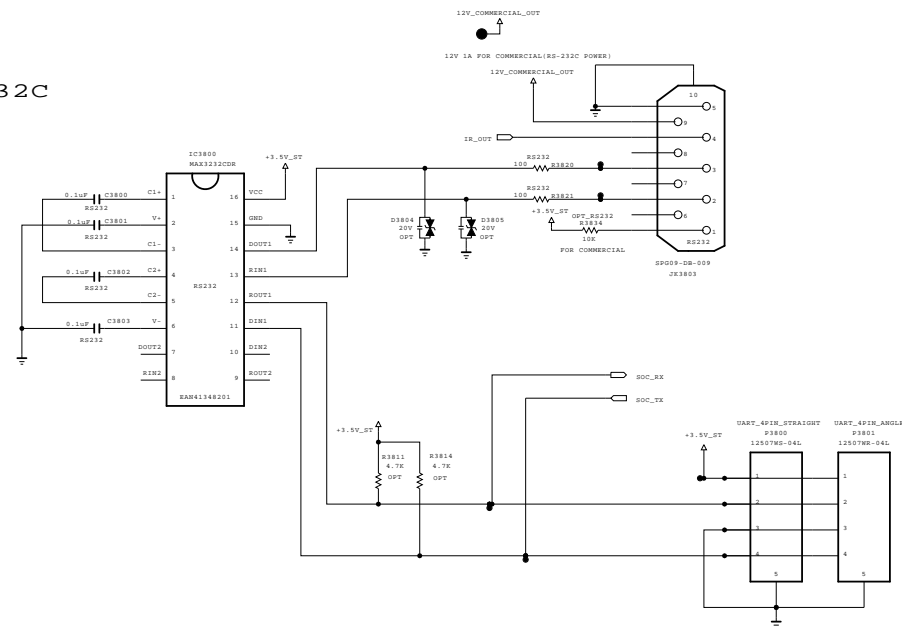


|       |                 |       |            |
|-------|-----------------|-------|------------|
| MODEL | JACK HIGH / MID | DATE  | 2011.11.21 |
| BLOCK |                 | SHEET | 36 /       |

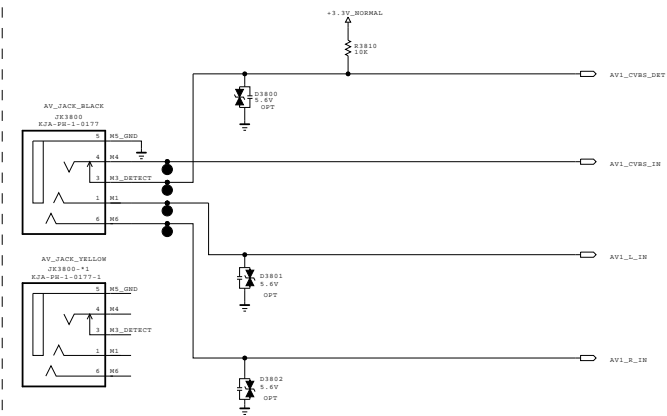


|       |             |       |            |
|-------|-------------|-------|------------|
| MODEL | JACK_COMMON | DATE  | 2011.11.21 |
| BLOCK |             | SHEET | 37 /       |

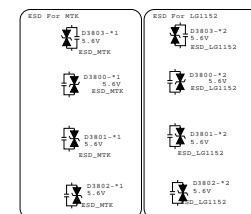
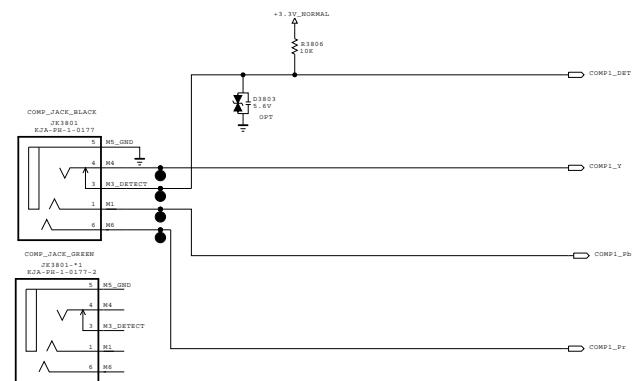
## RS232C





CVBS 1 PHONE JACK



COMPONENT 1 PHONE JACK



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SECRET  
LGElectronics

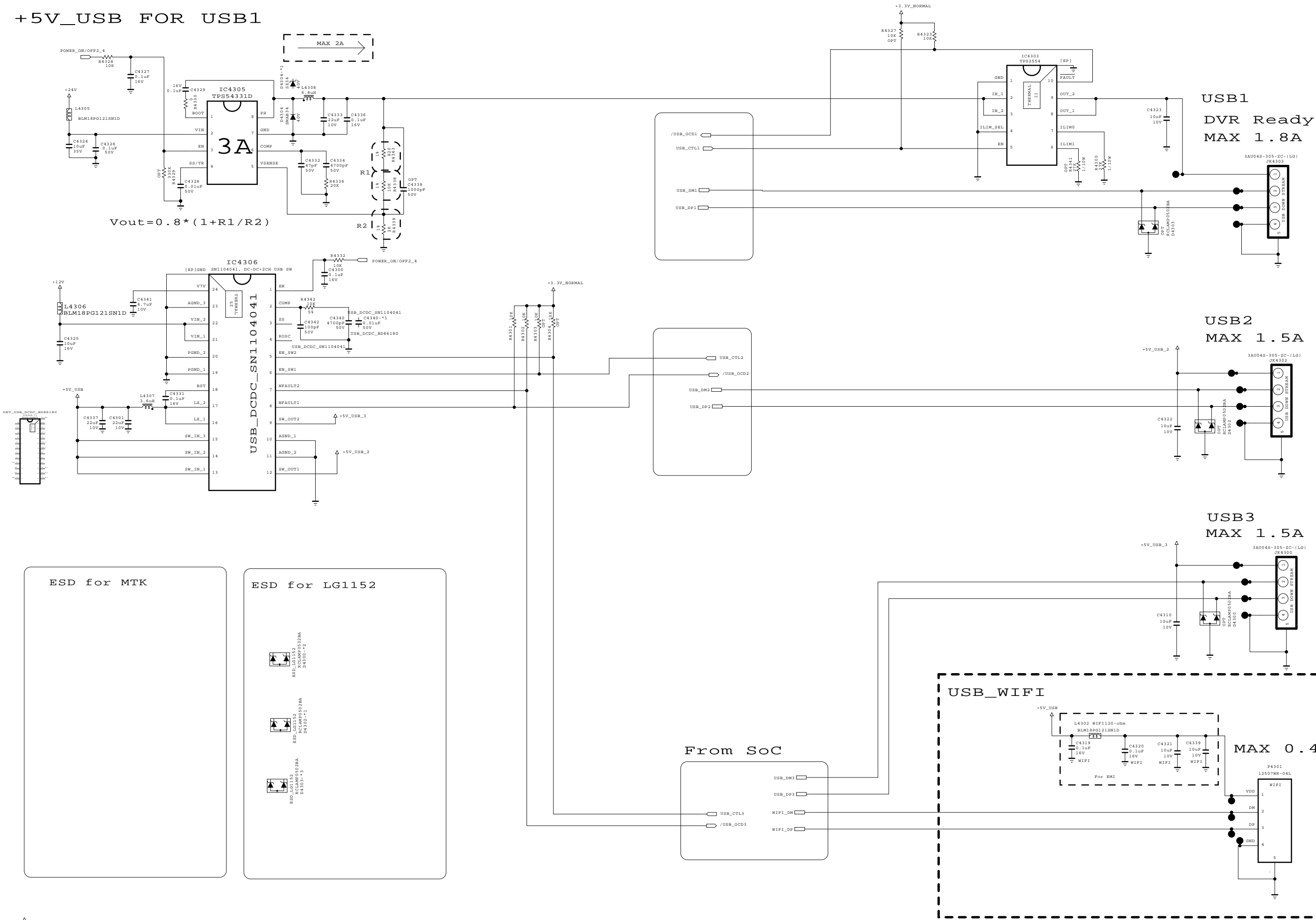




|       |             |       |            |
|-------|-------------|-------|------------|
| MODEL | JACK_COMMON | DATE  | 2011.11.21 |
| BLOCK |             | SHEET | 38 /       |

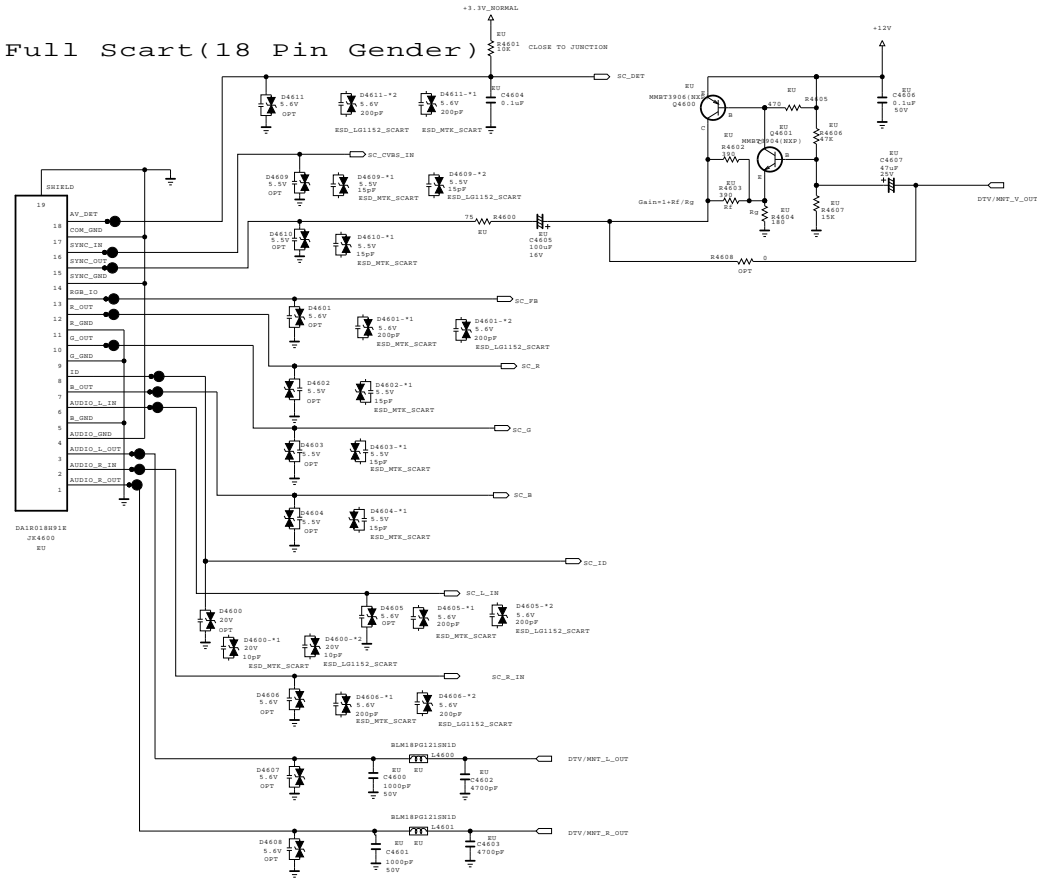






+5V\_USB FOR USB1



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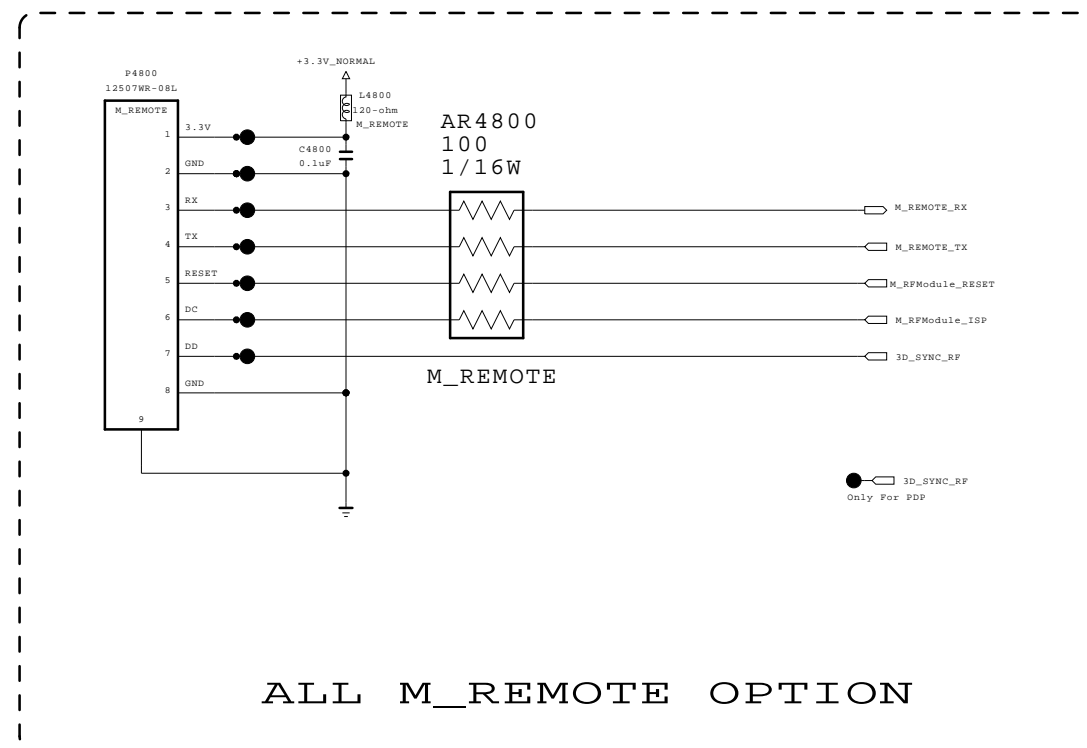
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

SECRET  
LGElectronics



|       |              |       |            |
|-------|--------------|-------|------------|
| MODEL | SCART GENDER | DATE  | 2011.10.26 |
| BLOCK |              | SHEET | 46         |

## ZigBee\_Radio Pulse M\_REMOTE OPTION



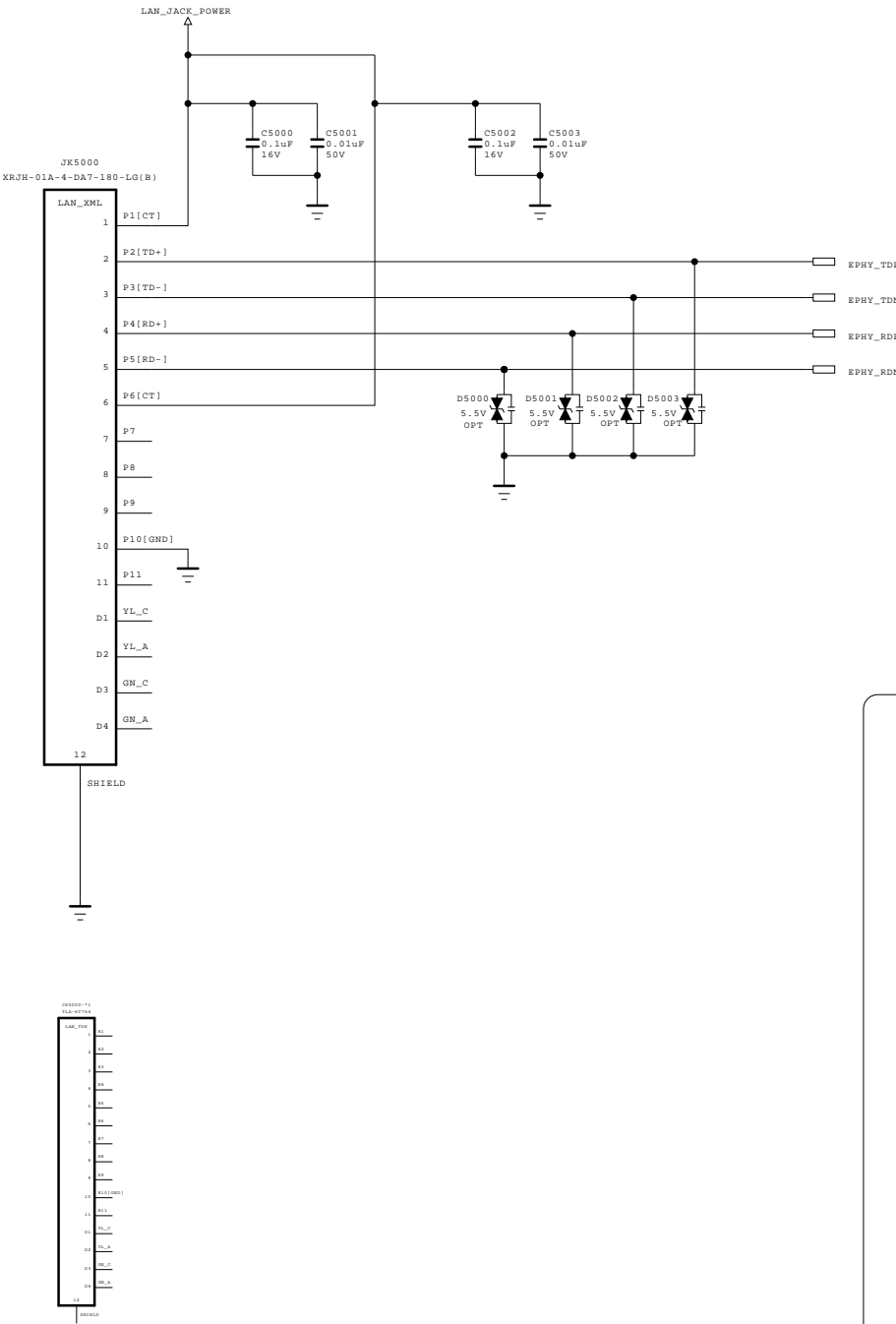
THE ⚠ SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMATIC.

SECRET  
LGElectronics

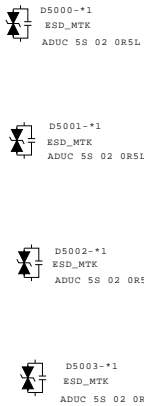


|       |               |       |            |
|-------|---------------|-------|------------|
| MODEL | MOTION REMOTE | DATE  | 2011.11.21 |
| BLOCK |               | SHEET | 48 /       |

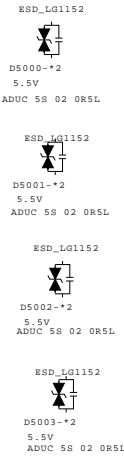
Ethernet Block





ESD for MTK



ESD for LG1152

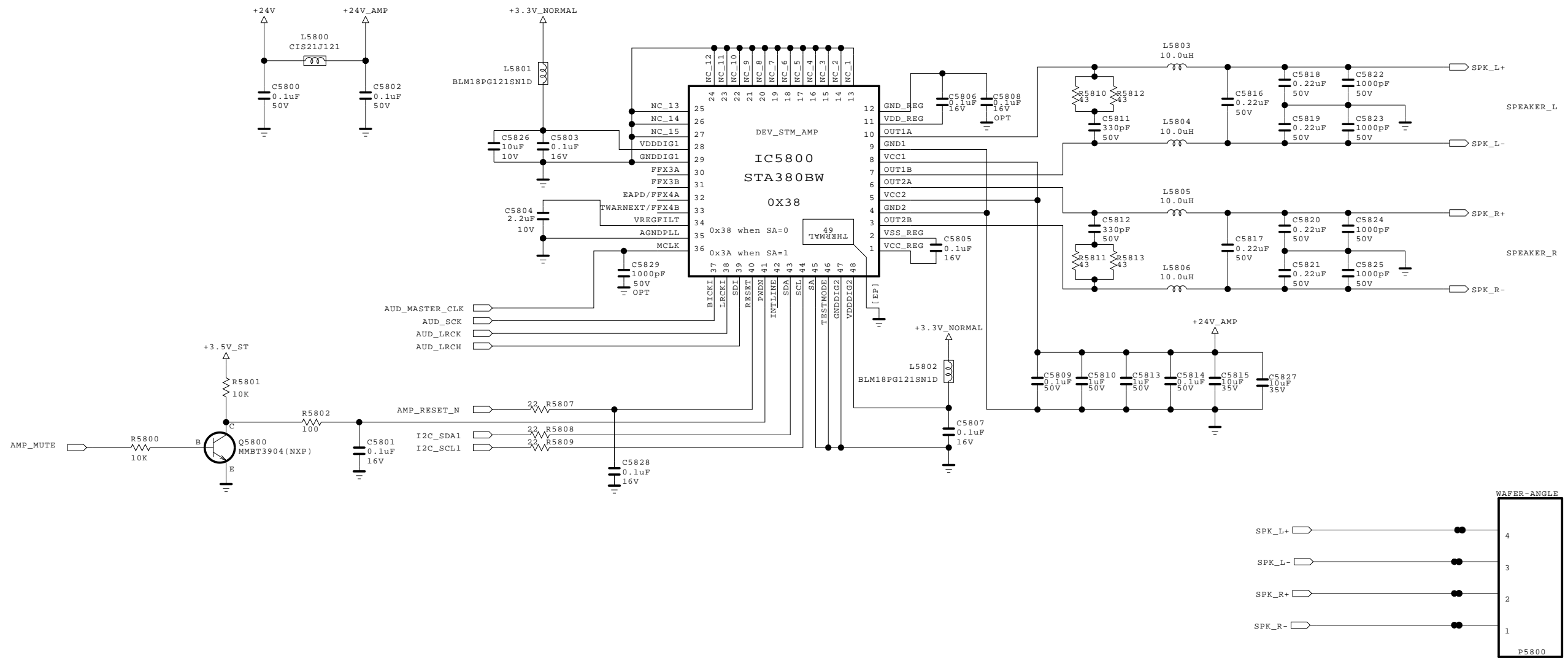




THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

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|       |              |       |            |
|-------|--------------|-------|------------|
| MODEL | LAN_VERTICAL | DATE  | 2011.12.09 |
| BLOCK |              | SHEET | 50 /       |

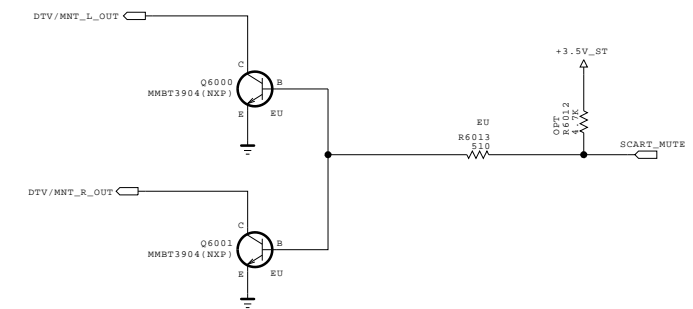
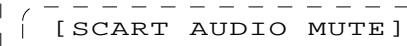


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|       |            |       |            |
|-------|------------|-------|------------|
| MODEL | GP4_MT5369 | DATE  | 2011.11.21 |
| BLOCK | AUDIO[ST]  | SHEET | 58 /       |

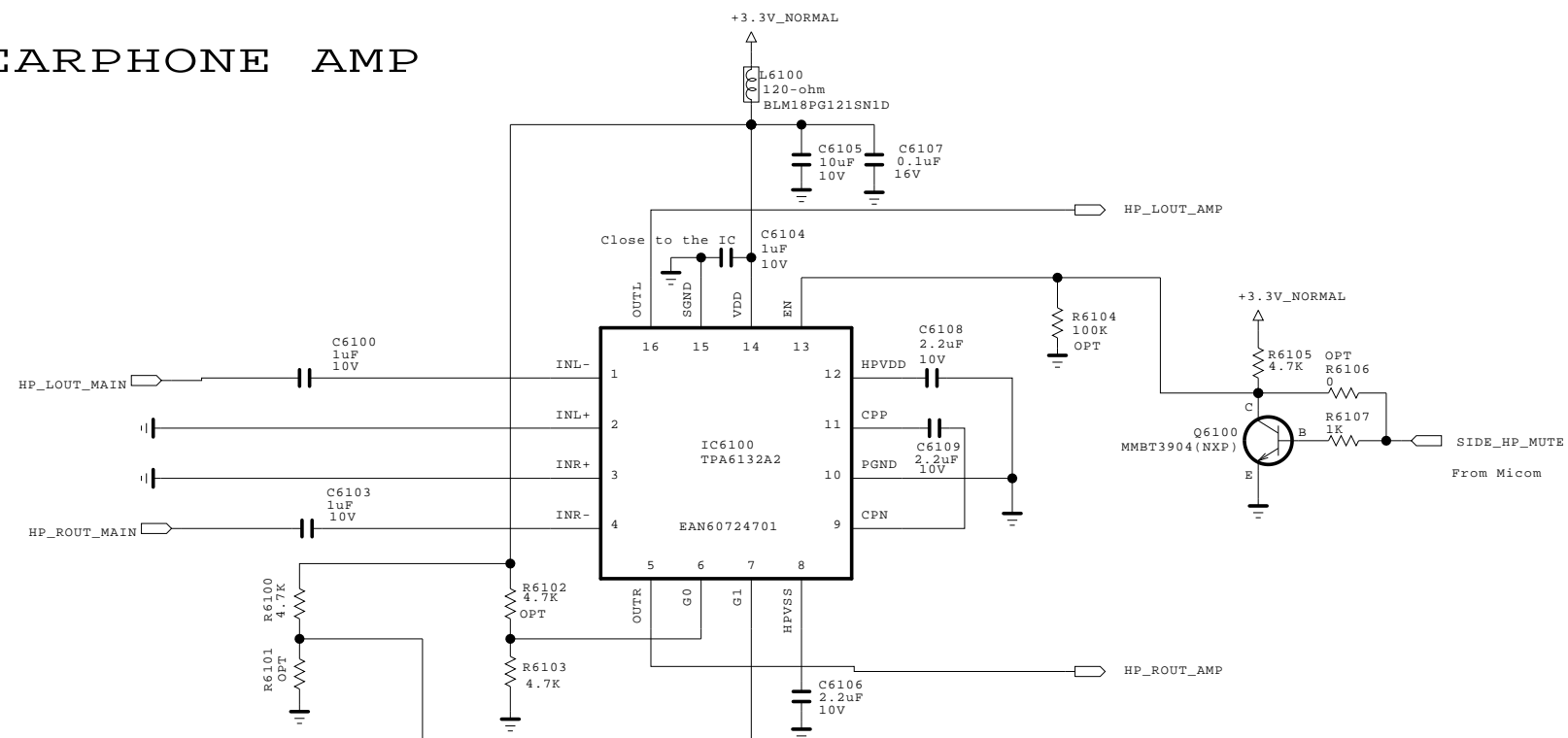




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|       |                 |       |            |
|-------|-----------------|-------|------------|
| MODEL | SCART AUDIO AMP | DATE  | 2011.11.21 |
| BLOCK |                 | SHEET | 60 /       |

# EARPHONE AMP

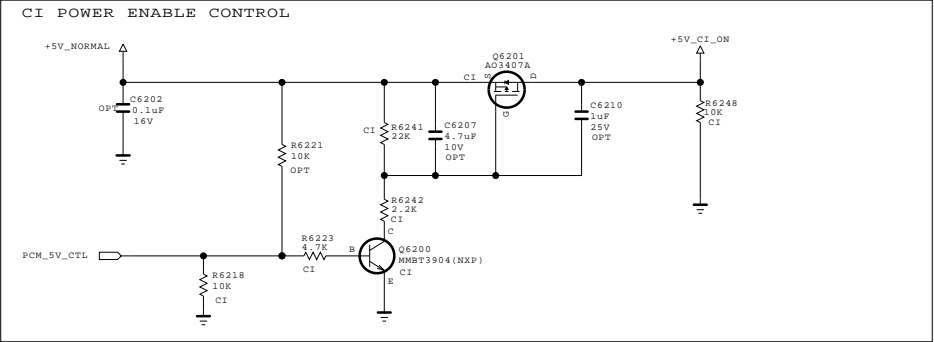


THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

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|-------|---------------|-------|------------|
| MODEL | HEADPHONE AMP | DATE  | 2011.09.29 |
| BLOCK |               | SHEET | 61 /       |



Option FOR MTK

C6210-\*1  
1uF  
25V  
CI\_MTK

Option FOR LG1152

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|       |         |       |            |
|-------|---------|-------|------------|
| MODEL | CI SLOT | DATE  | 2011.10.31 |
| BLOCK |         | SHEET | 62 /       |



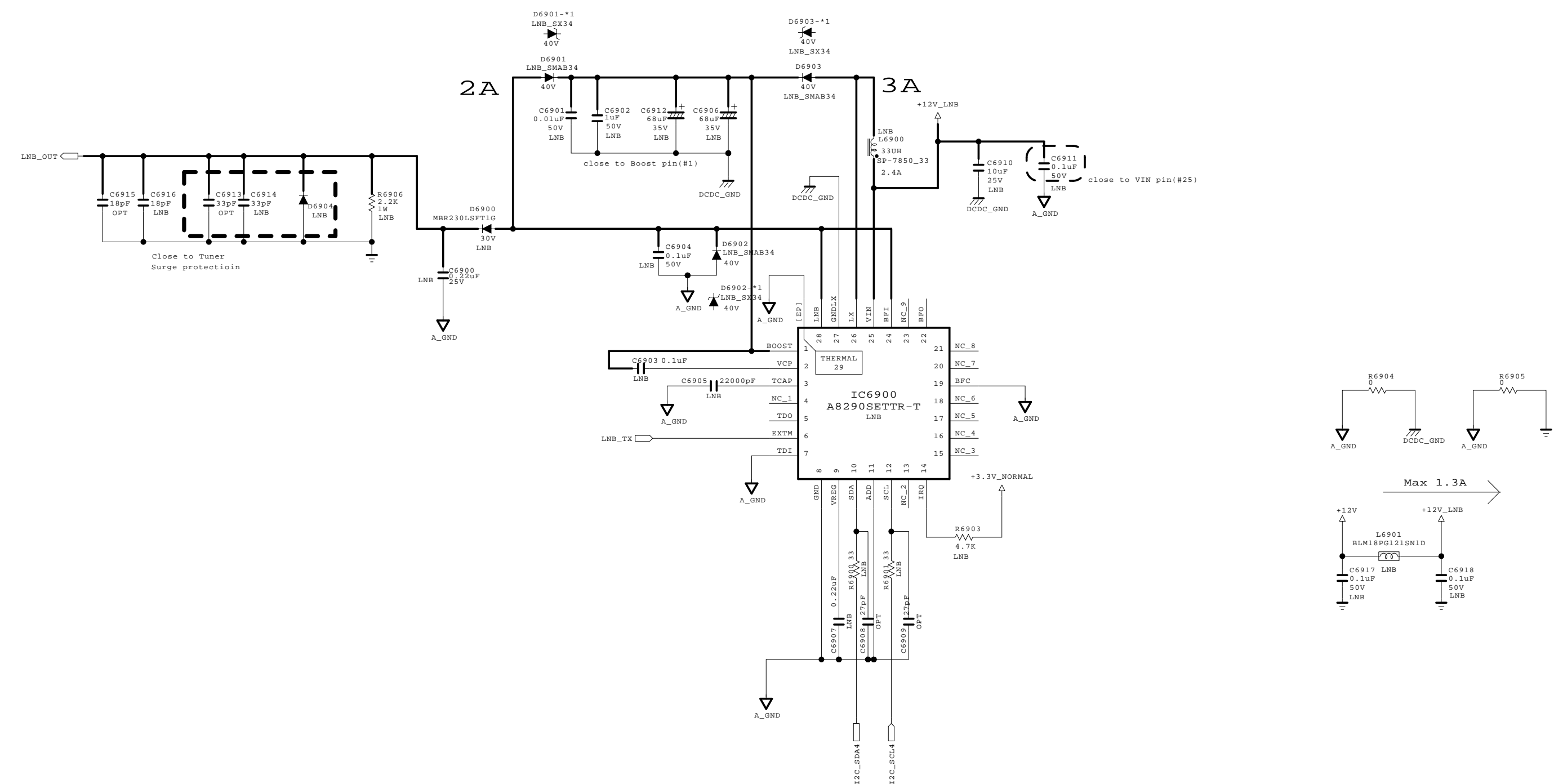


# DVB-S2 LNB Part Allegro

(Option:LNB)

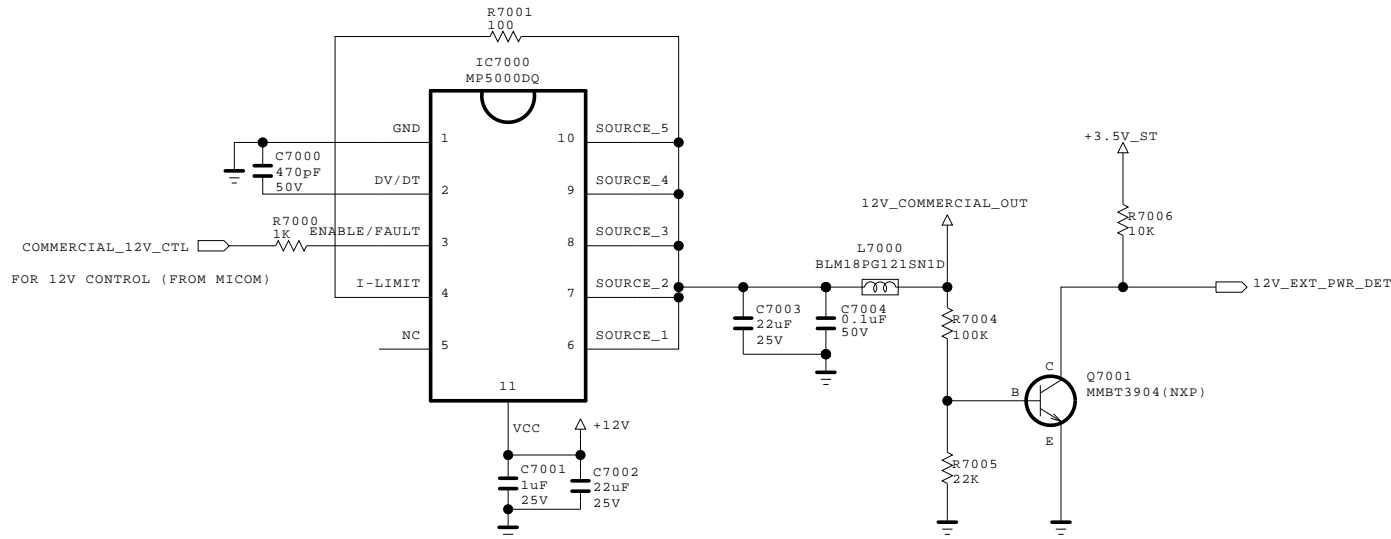
DCDC\_GND and A\_GND are connected  
DCDC\_GND and A\_GND are connected in pin#27  
PCB\_GND and A\_GND are connected

Input trace widths should be sized to conduct at least 3A  
Output trace widths should be sized to conduct at least 2A

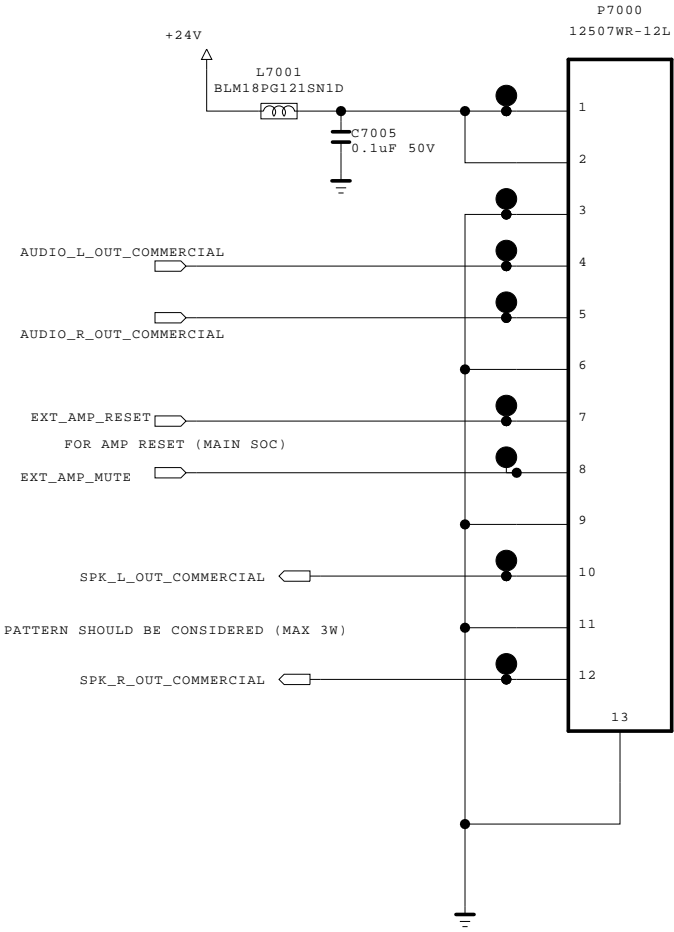


THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

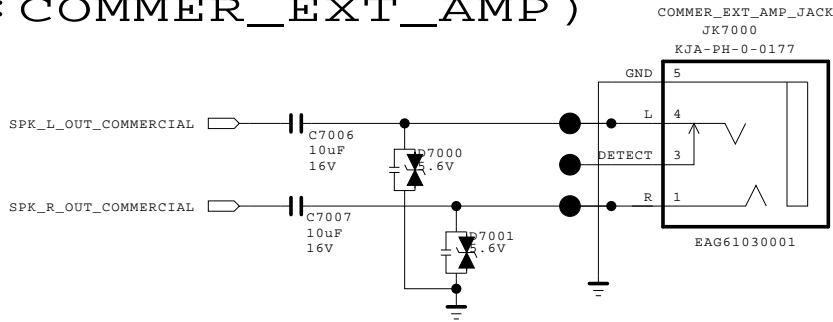
FOR COMMERCIAL 12V OUT RS-232C 9 PIN  
(OPT:COMMER\_EXT\_12V)





FOR COMMERCIAL AUDIO OUT  
(OPT:COMMER\_EXT\_AMP)



AUDIO OUT JACK  
(OPT:COMMER\_EXT\_AMP)



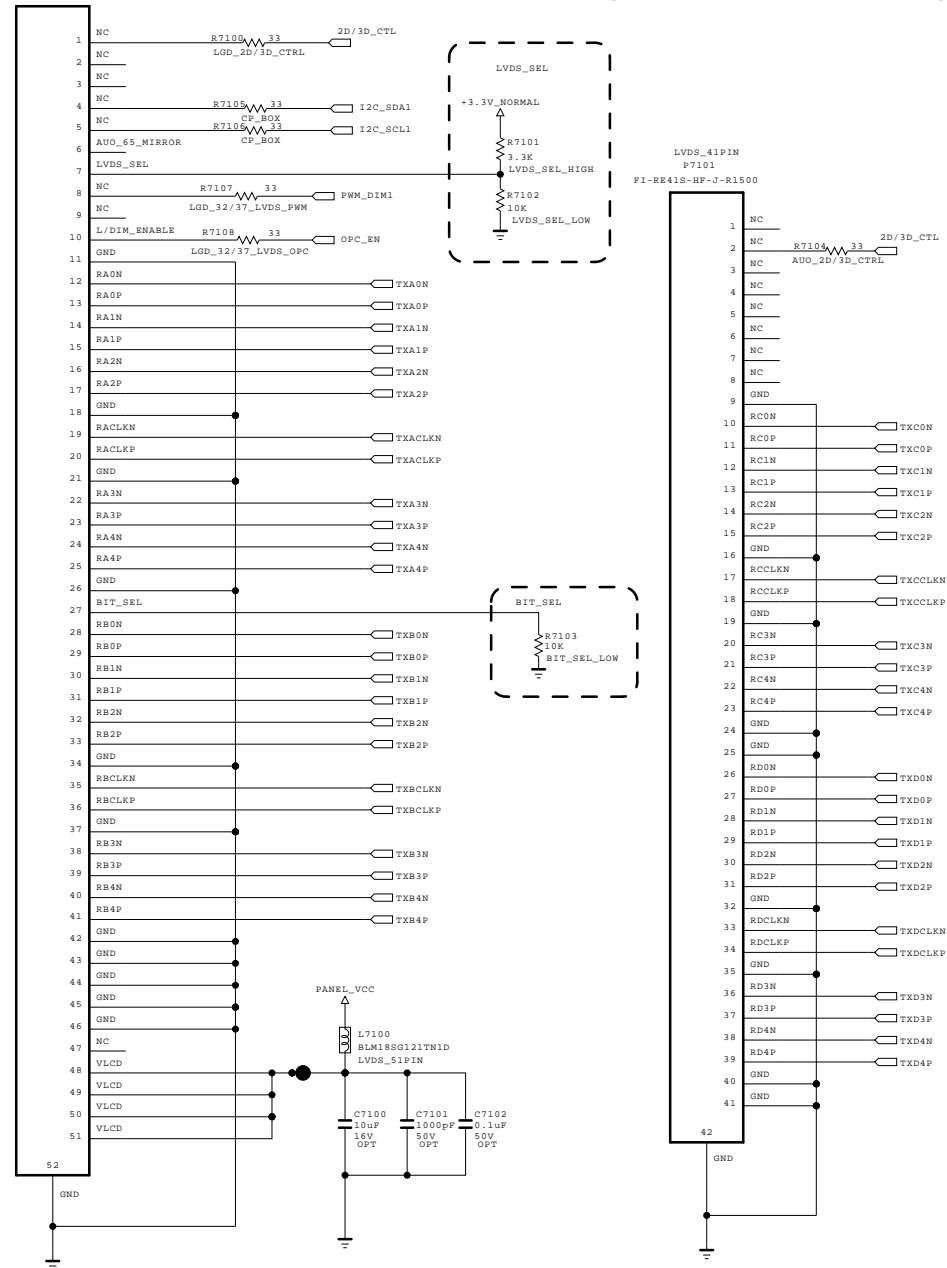
THE  SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMETIC.

# LVDS

LVDS\_51PIN  
P7100  
PI-RE51S-WF-J-R1500

[51Pin LVDS OUTPUT Connector]

[41Pin LVDS OUTPUT Connector]

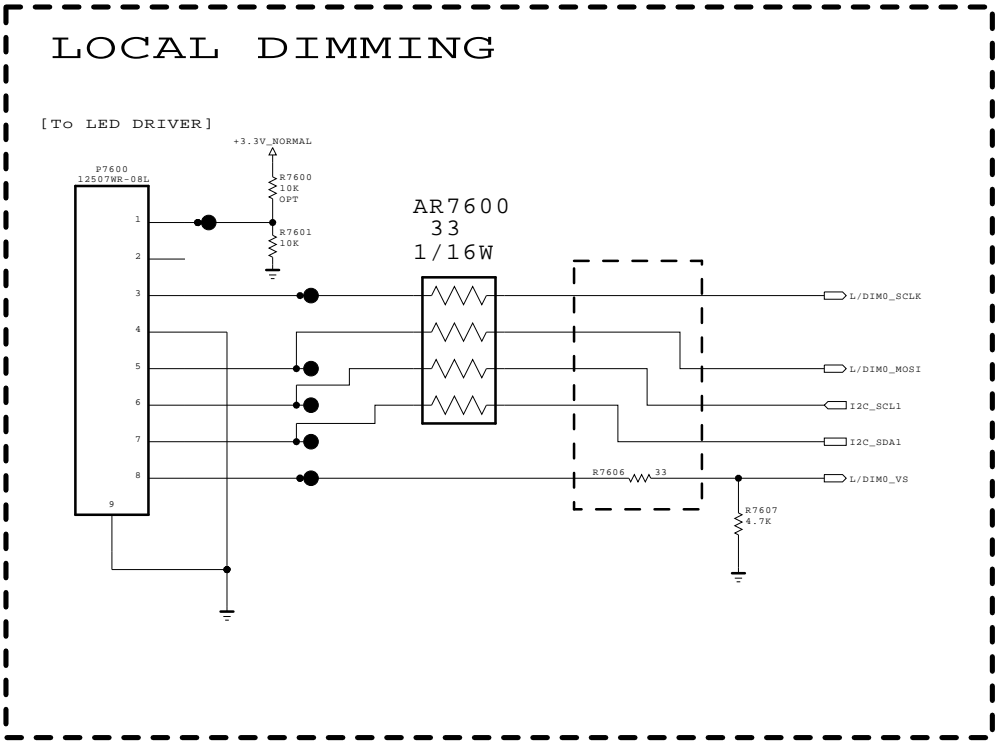




THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

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|       |               |       |            |
|-------|---------------|-------|------------|
| MODEL | LVDS_HIGH_MID | DATE  | 2011.08.11 |
| BLOCK |               | SHEET | 71 /       |



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SECRET  
LGElectronics

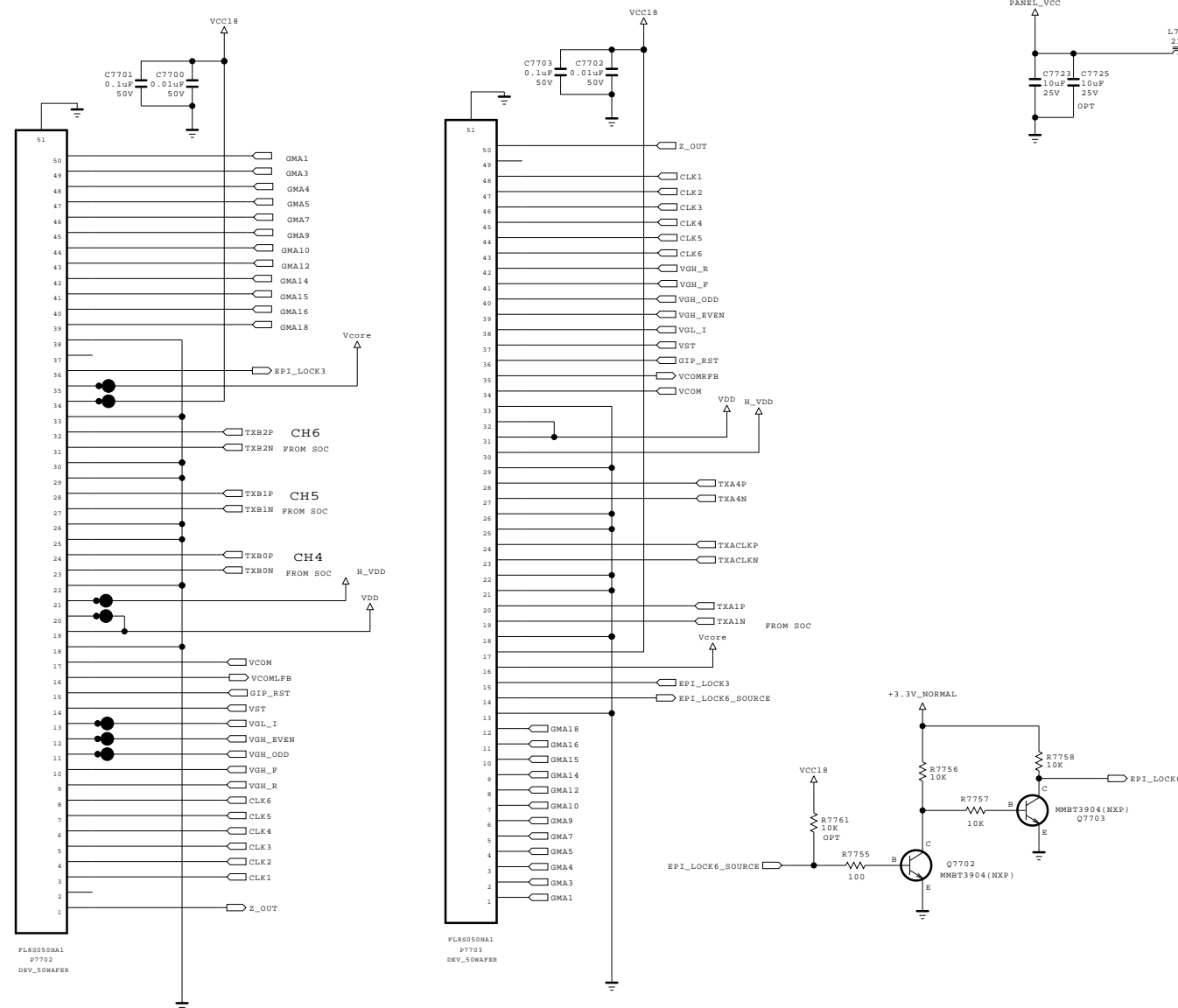


|       |               |       |            |
|-------|---------------|-------|------------|
| MODEL | LOCAL DIMMING | DATE  | 2011.11.21 |
| BLOCK |               | SHEET | 76 /       |

The diagram illustrates the power management section of a Raspberry Pi 4B PCB. The central component is the TPS65178RSLR PMIC, which manages power for the CPU, GPU, and other peripherals. Key features include:

- Power Input:** VCC18 (18V) and Vcore (1.1V) inputs with associated decoupling capacitors (C7705, C7708, C7706, C7709, C7710, C7711, C7712, C7713, C7714, C7716, C7717, C7718, C7719, C7720, C7721, C7722, C7723, C7724, C7725, C7726, C7727, C7728, C7729, C7730, C7731, C7732, C7733, C7734, C7735, C7736, C7737, C7738, C7739, C7740, C7741, C7742, C7743, C7744, C7745, C7746, C7747, C7748, C7749, C7750, C7751, C7752, C7753, C7754, C7755, C7756, C7757, C7758, C7759, C7760, C7761, C7762, C7763, C7764, C7765, C7766, C7767, C7768, C7769, C7770, C7771, C7772, C7773, C7774, C7775, C7776, C7777, C7778, C7779, C7780, C7781, C7782, C7783, C7784, C7785, C7786, C7787, C7788, C7789, C7790, C7791, C7792, C7793, C7794, C7795, C7796, C7797, C7798, C7799, C7800, C7801, C7802, C7803, C7804, C7805, C7806, C7807, C7808, C7809, C7810, C7811, C7812, C7813, C7814, C7815, C7816, C7817, C7818, C7819, C7820, C7821, C7822, C7823, C7824, C7825, C7826, C7827, C7828, C7829, C7830, C7831, C7832, C7833, C7834, C7835, C7836, C7837, C7838, C7839, C7840, C7841, C7842, C7843, C7844, C7845, C7846, C7847, C7848, C7849, C7850, C7851, C7852, C7853, C7854, C7855, C7856, C7857, C7858, C7859, C7860, C7861, C7862, C7863, C7864, C7865, C7866, C7867, C7868, C7869, C7870, C7871, C7872, C7873, C7874, C7875, C7876, C7877, C7878, C7879, C7880, C7881, C7882, C7883, C7884, C7885, C7886, C7887, C7888, C7889, C7890, C7891, C7892, C7893, C7894, C7895, C7896, C7897, C7898, C7899, C7900, C7901, C7902, C7903, C7904, C7905, C7906, C7907, C7908, C7909, C7910, C7911, C7912, C7913, C7914, C7915, C7916, C7917, C7918, C7919, C7920, C7921, C7922, C7923, C7924, C7925, C7926, C7927, C7928, C7929, C7930, C7931, C7932, C7933, C7934, C7935, C7936, C7937, C7938, C7939, C7940, C7941, C7942, C7943, C7944, C7945, C7946, C7947, C7948, C7949, C7950, C7951, C7952, C7953, C7954, C7955, C7956, C7957, C7958, C7959, C7960, C7961, C7962, C7963, C7964, C7965, C7966, C7967, C7968, C7969, C7970, C7971, C7972, C7973, C7974, C7975, C7976, C7977, C7978, C7979, C7980, C7981, C7982, C7983, C7984, C7985, C7986, C7987, C7988, C7989, C7990, C7991, C7992, C7993, C7994, C7995, C7996, C7997, C7998, C7999, C8000, C8001, C8002, C8003, C8004, C8005, C8006, C8007, C8008, C8009, C8010, C8011, C8012, C8013, C8014, C8015, C8016, C8017, C8018, C8019, C8020, C8021, C8022, C8023, C8024, C8025, C8026, C8027, C8028, C8029, C8030, C8031, C8032, C8033, C8034, C8035, C8036, C8037, C8038, C8039, C8040, C8041, C8042, C8043, C8044, C8045, C8046, C8047, C8048, C8049, C8050, C8051, C8052, C8053, C8054, C8055, C8056, C8057, C8058, C8059, C8060, C8061, C8062, C8063, C8064, C8065, C8066, C8067, C8068, C8069, C8070, C8071, C8072, C8073, C8074, C8075, C8076, C8077, C8078, C8079, C8080, C8081, C8082, C8083, C8084, C8085, C8086, C8087, C8088, C8089, C8090, C8091, C8092, C8093, C8094, C8095, C8096, C8097, C8098, C8099, C8100, C8101, C8102, C8103, C8104, C8105, C8106, C8107, C8108, C8109, C8110, C8111, C8112, C8113, C8114, C8115, C8116, C8117, C8118, C8119, C8120, C8121, C8122, C8123, C8124, C8125, C8126, C8127, C8128, C8129, C8130, C8131, C8132, C8133, C8134, C8135, C8136, C8137, C8138, C8139, C8140, C8141, C8142, C8143, C8144, C8145, C8146, C8147, C8148, C8149, C8150, C8151, C8152, C8153, C8154, C8155, C8156, C8157, C8158, C8159, C8160, C8161, C8162, C8163, C8164, C8165, C8166, C8167, C8168, C8169, C8170, C8171, C8172, C8173, C8174, C8175, C8176, C8177, C8178, C8179, C8180, C8181, C8182, C8183, C8184, C8185, C8186, C8187, C8188, C8189, C8190, C8191, C8192, C8193, C8194, C8195, C8196, C8197, C8198, C8199, C8200, C8201, C8202, C8203, C8204, C8205, C8206, C8207, C8208, C8209, C8210, C8211, C8212, C8213, C8214, C8215, C8216, C8217, C8218, C8219, C8220, C8221, C8222, C8223, C8224, C8225, C8226, C8227, C8228, C8229, C8230, C8231, C8232, C8233, C8234, C8235, C8236, C8237, C8238, C8239, C8240, C8241, C8242, C8243, C8244, C8245, C8246, C8247, C8248, C8249, C8250, C8251, C8252, C8253, C8254, C8255, C8256, C8257, C8258, C8259, C8260, C8261, C8262, C8263, C8264, C8265, C8266, C8267, C8268, C8269, C8270, C8271, C8272, C8273, C8274, C8275, C8276, C8277, C8278, C8279, C8280, C8281, C8282, C8283, C8284, C8285, C8286, C8287, C8288, C8289, C8290, C8291, C8292, C8293, C8294, C8295, C8296, C8297, C8298, C8299, C8300, C8301, C8302, C8303, C8304, C8305, C8306, C8307, C8308, C8309, C8310, C8311, C8312, C8313, C8314, C8315, C8316, C8317, C8318, C8319, C8320, C8321, C8322, C8323, C8324, C8325, C8326, C8327, C8328, C8329, C8330, C8331, C8332, C8333, C8334, C8335, C8336, C8337, C8338, C8339, C8340, C8341, C8342, C8343, C8344, C8345, C8346, C8347, C8348, C8349, C8350, C8351, C8352, C8353, C8354, C8355, C8356, C8357, C8358, C8359, C8360, C8361, C8362, C8363, C8364, C8365, C8366, C83

[Left Source(51PIN LOCATION)] [Right Source(41PIN LOCATION)]

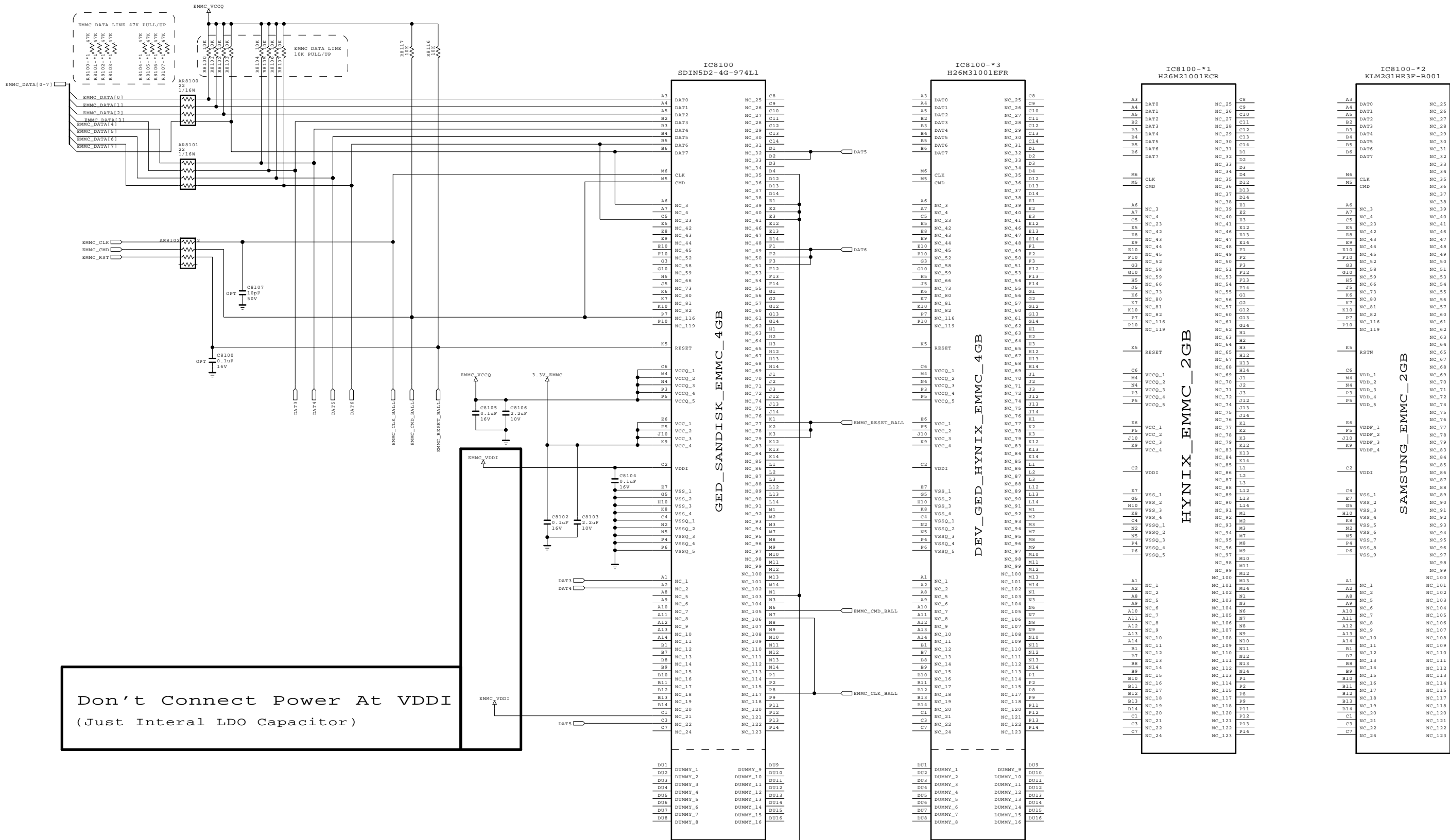


SECRET  
LGElectronics



|       |       |       |            |
|-------|-------|-------|------------|
| MODEL |       | DATE  | 2011.12.01 |
| BLOCK | T-Con | SHEET | 77 /       |

eMMC I / F

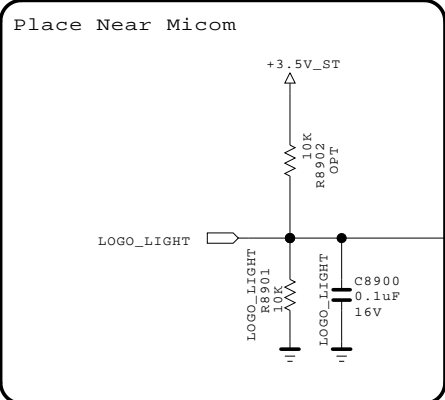


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|                |      |               |                |
|----------------|------|---------------|----------------|
| MODEL<br>BLOCK | eMMC | DATE<br>SHEET | 11.09.29<br>81 |
|----------------|------|---------------|----------------|



SECRET  
LG Electronics





